# Engineering News-Record

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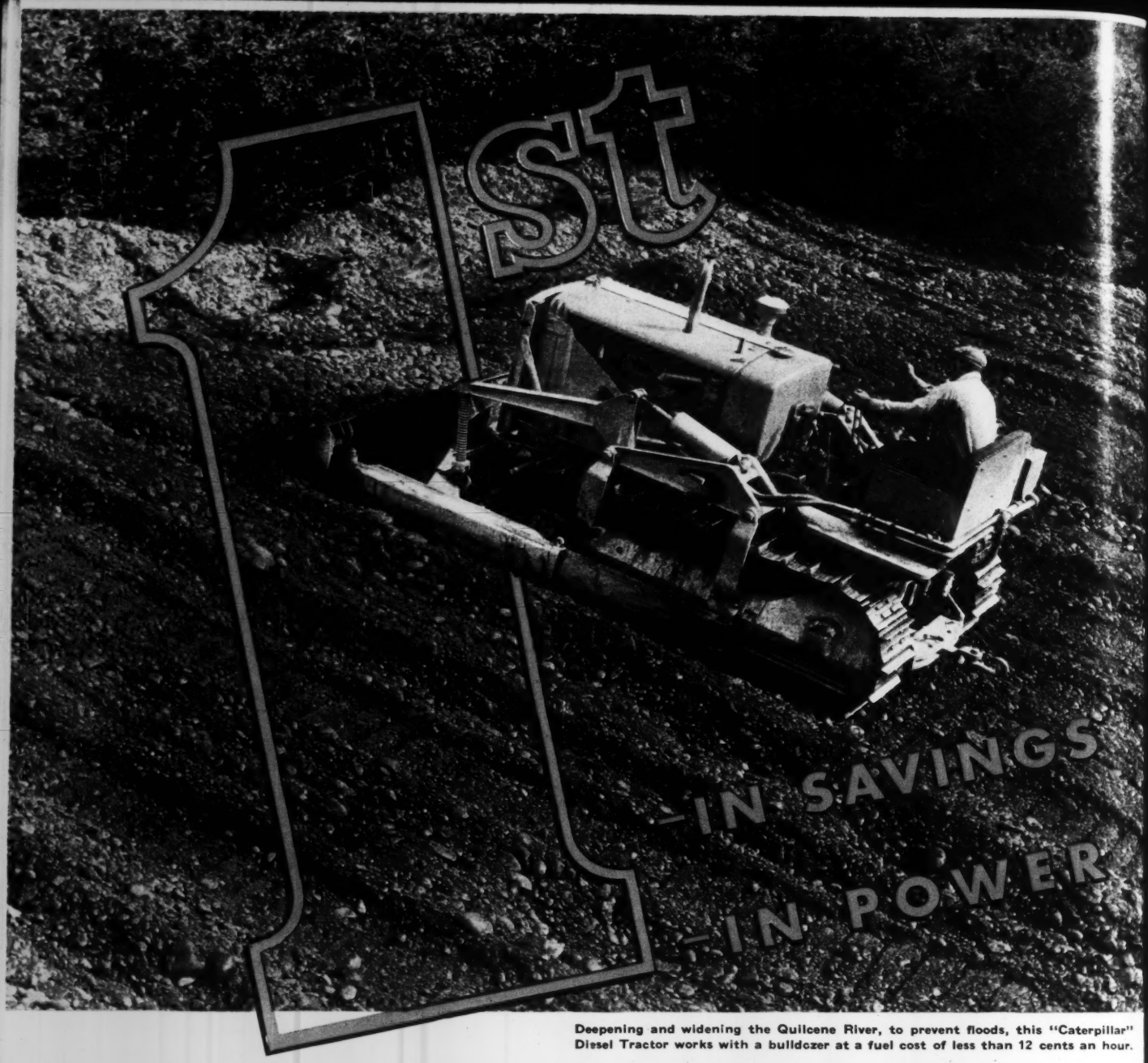
## SILHOUETTE OF PROGRESS

Triple spinning wheels, most radical innovation in seventy-five years of suspension bridge building, are introduced on the Golden Gate Bridge where twenty-four wires, instead of the usual four, are being placed in each cable simultaneously.

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**The difference between today's and yesterday's tractor power costs is the difference between the "Caterpillar" Diesel Tractor and the gasoline machine. Today, bids are made and contracts won on the savings that "Caterpillar" Diesel operation makes possible—fuel costs cut 60% to 80%, up-keep costs reduced to a record minimum. And the "Caterpillar" Diesel's versatile, heavy-duty engine—and its sure-traction, wear-resistant tracks—make another difference, raising work production, setting new figures for dependability and stamina. Get the whole story of the SHOW-DOWN from your dealer. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.**

## THESE ARE SHOW-DOWN FACTS:

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# *Distribution* or *Exchange?*

THROUGHOUT the economic discussions of the last few years the loose and inaccurate use of one term has confused much thinking. With all due allowance for a writer's tendency to make too fine a point of words, the fact is that words are symbols of ideas and images: when we use the wrong word we not only obstruct the exchange of thought; we also implant ideas and images that may deceive and mislead.

Such a perversion is the use of the word "distribution" to describe our process of conveying wealth from producers to users. Frequently we see reference to the essential functions of "production and distribution." Inevitably such a reference pictures people at work producing commodities and services which, flowing into some sort of pool, then are distributed with some regard for individual needs.

In our economy such a picture is, of course, wholly inaccurate. Distribution, in that sense, may be practiced under some other economy but it cannot prevail under ours. Distribution naturally implies a distributing agency to regulate production, take over the produce and determine, by one formula or another, how much shall be allotted to this group or that individual. In short, some one must "play God" and hold the balance of life or death between the individuals who compose the community. Obviously such a function is alien to our system; those who use the term "distribution," whether they know it or not, are assuming an economy wholly different from that under which we actually work.

The process thus miscalled "distribution" is, in fact, *exchange*. The basic activities of our economy are not production and distribution; they are *production* and *exchange*. To talk of distribution in an economy that professes to be founded on individual initiative and free enterprise is absurd, for it involves a contradiction of terms.

THE practical importance of all this is that once we begin to talk of exchange, we begin to remind men that if they would partake of the productivity of others they must themselves produce something useful to be offered in exchange. "Distribution" may imply passive receptivity; exchange necessarily implies active productivity as an essential to sharing.

All this talk about the distribution of wealth has fooled many people into believing that somehow production can and will continue without their personal participation, and that, by some financial or legislative magic, they can cut themselves in on the distribution. They imagine that "the community" will continue to produce and distribute the wherewithal to live, forgetting that the community has no productive power aside from that of the individuals who compose it. With human nature as it is, more and more of us decide that it is easier or smarter to get what we need by speculation, manipulation or legislation rather than by production. Such notions are strengthened by talk of *distributing* wealth; they are weakened by talk of *exchanging* it.

ONCE again, without laboring a matter of words, would it not help if those who discuss these problems publicly would say what they really mean? Would it not help the man on the street to see himself as a producer, getting what he needs from others only by virtue of what he offers in exchange, rather than through his speculative shrewdness or his "right to a living?"

All this is offered in full acceptance of the social ideal that society as a whole should provide for those truly unfortunate who, through no fault of their own, cannot produce equal to their needs. Neither does it forget that if we would preserve our present system we must reform it sufficiently to insure to the able-bodied an opportunity to produce continuously and exchange their produce freely. Here is our real problem; more emphasis on exchange should make clearer to all that the weaknesses of the existing system reside in its handling of that vital function.

We can make progress with such reform only as we face that fact; we cannot do it by building up the notion that the community "owes every man a living" and that his problem is merely to wrangle for himself by hook or crook an increasing share in the "distribution" of our abundance, regardless of what he may contribute to it. Such a course tends to tear down our existing *economy of exchange* and substitute for it an economy of *distribution*.

Willard Chevalier

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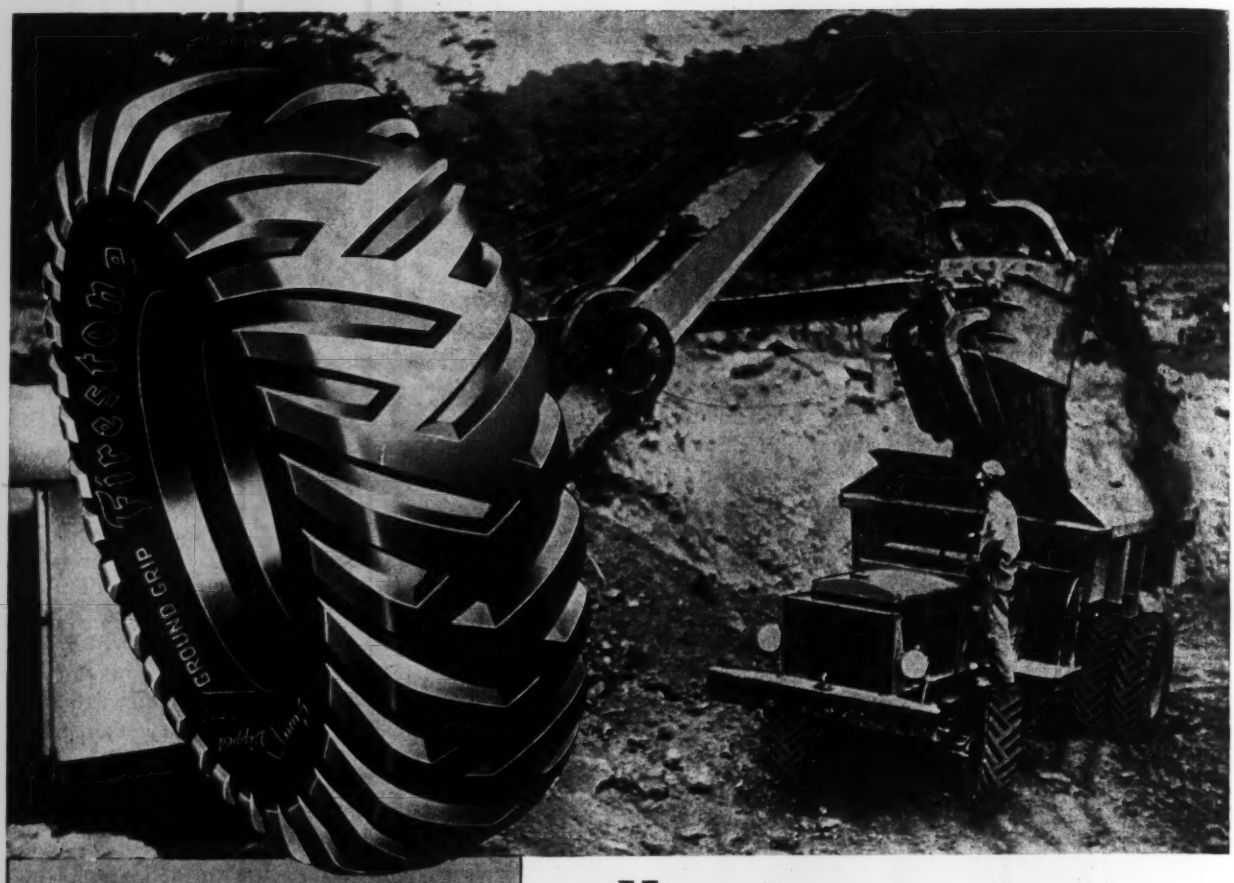


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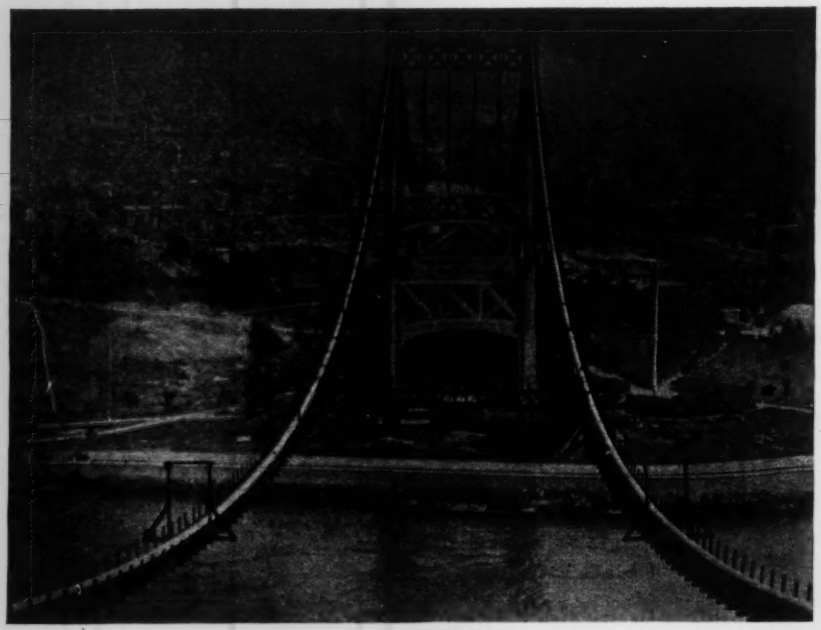
**A BURNING QUESTION** —Incineration of municipal wastes—garbage and combustible refuse of all kinds—has a half-century history in this country and yet today presents one of the most vexing problems with which the city engineer must cope. What have we learned in 50 years? Are there basic principles of incineration design, and are they being utilized?

Beginning in the May 14 issue, Edward D. Very draws on his 30 years' experience with waste disposal problems to answer these questions in two timely articles.

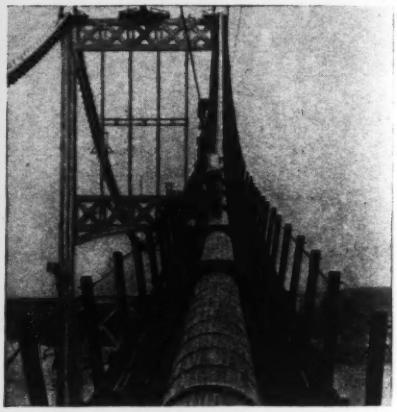
# *Widest Two-Cable Suspension*

## SPANS HELL GATE

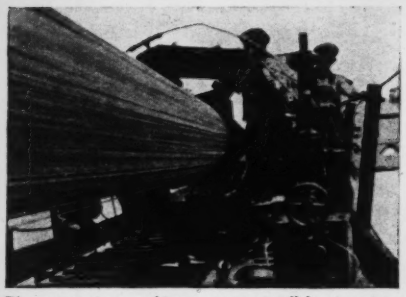


*Looking from Ward's Island tower at the 1380 ft. center span as it crosses Hell Gate.*

*These splayed strands are connected to the eyebar anchors.*



*This cable has been compacted and is to be wrapped. In place already are several cable bands from which hang the suspender ropes. Note temporary catwalk used for erecting the cable.*

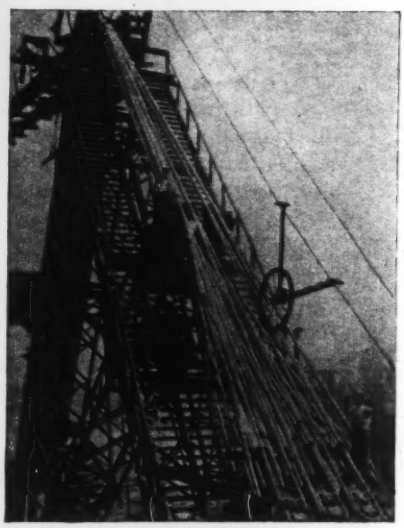


*The compacting machine squeezes parallel wires into circular cable.*

FROM two cables, spaced 98 feet apart, hangs the 8-lane, 87-foot roadway of the East River Crossing of the Triborough Bridge nearing completion in New York City. Each parallel-wire cable, 20⅝ inches in diameter, was spun in 37 strands of 248 wires each — 9,176 per cable.

The side spans approximate 705 feet in length from towers to cable bent posts, which deflect the cables downward at a 45 degree slope to enter the gravity-type anchorages. Embedded in these anchorages are the girder grillages and eyebars which anchor the splayed cable strands.

These cables complete with suspender and hand ropes, cable and splay bands, bearing blocks and strand shoes were erected by American Bridge Company, who also fabricated the eyebars and structural steel grillage for the cable anchorages. American Steel & Wire Company supplied the galvanized steel wire for the cables and the pre-stressed suspender ropes. For any of your needs in steel structures, the resources of the American Bridge Company are at your disposal.



*Spinning individual wires into strands as the wheel mounted on V-shaped frame travels up the side span at Astoria anchorage. At the bottom, strands circle strand shoes, which later connect to the eyebar anchors.*

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ENGINEERING NEWS-RECORD

April 30, 1936

FIG. 1—TWENTY-FOUR WIRES AT A TIME are being laid in each cable of the 4,200-ft. span Golden Gate Bridge as compared with the four wires possible by conventional procedure. Triple spinning wheels and double tramways, introduced for the first time on this bridge, make this remarkable advance possible.

# Largest and Longest Bridge Cables Spun at New Record Rate

By Charles M. Jones
*Assistant Chief Engineer, Bridge Dept., John A. Roebling Sons Co., Trenton, N. J.*

THE MAIN CABLES for the Golden Gate Bridge are not only the largest and longest yet attempted—their design or make-up is a decided departure from standard practice, and the equipment used in their erection and the stringing speed attained thereby mark another milestone in suspension-bridge construction. Briefly, by the use of triple spinning wheels and double tramways, 24 wires are being placed with each trip of the wheels as compared with only four wires on the George Washington Bridge at New York.

Previously all parallel-wire cables have been built up with 7, 19, 37 or 61 parallel-wire strands, all strands containing an equal number of wires and arranged with each successive layer of strands in the same horizontal plane. This practice results in a "straight-bottomed" hexagon, the vertical axis of which is considerably less than the horizontal axis. Upon compacting or squeezing, the finished cable is supposed to be formed into a circular section throughout its entire length except through and near the saddles, where it retains its original shape. The saddles, therefore, become the control points, and the positions and relations of strands and wires in the saddles fix the natural shape of the cable section throughout its length.

Fig. 2 shows cross-sections of the George Washington Bridge and Golden Gate Bridge cables taken at the saddles. It will be noted that the vertical overall dimension of the George Washington cable measures 34¾ in. This is a theoretical dimension based on the assumption that each of the 61 strands does not maintain the circular section but goes into an elongated oval with a vertical axis of 4½ in. and a horizontal axis of 5 in. It is well known that this theoretical condition is not maintained. What actually takes place is a general slumping of all wires in the saddle with a resulting decrease in the overall vertical dimension. The natural shape of the cable section at control points therefore becomes unknown, and the vertical axis is considerably less than the diameter of the compacted cable, which on the George Washington Bridge is 36 in. Actually, a circular section is attained only if the upper wires in the cable are pushed up from their natural position and held there at the expense of additional loading on the lower wires.

It is only to be expected, then, to find large parallel-wire cables slightly out of

round, with the horizontal axis exceeding the vertical. Although this condition is not serious, because the elastic stretch of the wires together with their great length allows the slight redistribution of stress to establish equilibrium, neither is it perfection. The Golden Gate Bridge represents the first attempt to achieve the perfect cable.

### A new cable design

As originally designed, the cable called for the conventional "straight-bottomed" hexagon section consisting of 61 strands, each strand composed of 452 No. 6 galvanized steel bridge wires. On the recommendation of the contractor, the design was changed to the section as shown in Fig. 2, whose chief characteristics are:

1. The section is rotated 30 deg. and now becomes "straight sided" rather than "straight bottomed."
2. The number of wires in a strand is varied with its position in the cable.
3. Fillers are introduced between adjacent strands in the saddle.

By introducing the "straight-sided hex" the major axis is placed in the vertical plane, and this together with a reduction of the number of wires in the extreme top and bottom strands fixes the vertical axis of the section to the dimension of the diameter of the compacted cable. The pitch angle of the top strands becomes 30 deg. rather than 60 deg., thereby increasing their stability.

Where previously cables were made up of horizontal layers of strands, the Golden Gate Bridge cable has vertical tiers. This permits the insertion of spacers between adjacent tiers during stringing, which allows the free circulation of air and tends to keep all wires at a uniform temperature. This in turn eliminates excessive cable rotation, which has at times either retarded or prevented good strand adjustment.

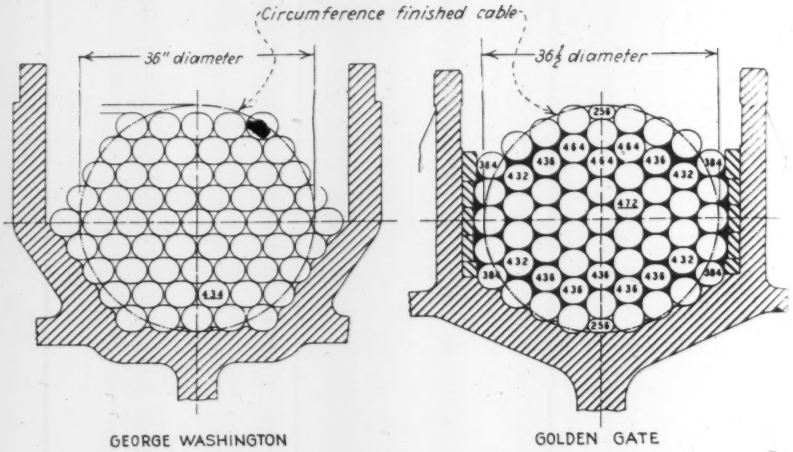



FIG. 2—NEW CABLE MAKE-UP on the Golden Gate Bridge compared with George Washington Bridge cable. For the first time the number of wires per strand is varied, to secure a more perfect circle through the saddle. The strands are also in vertical tiers instead of horizontal rows as formerly.

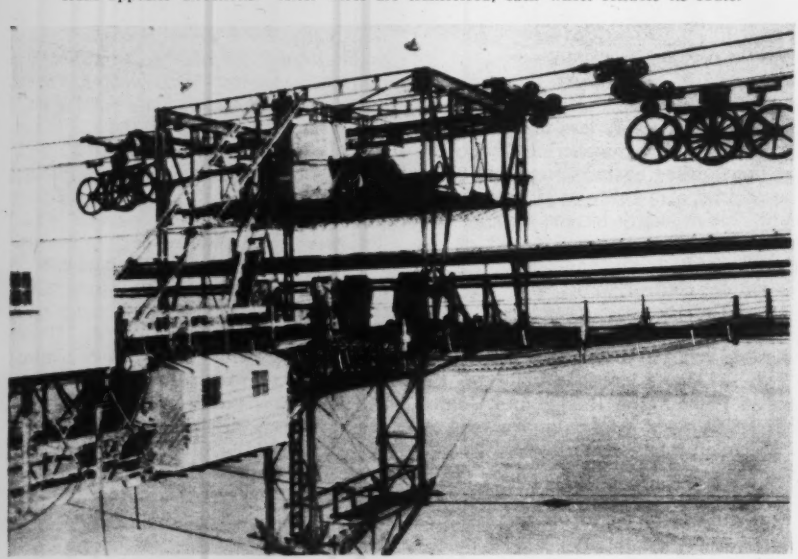
The number of wires in each strand was fixed after a careful study of wire displacement during compacting. Horizontal displacement of wires is not objectionable, but the vertical displacement of any wire that has been carefully adjusted to its proper deflection during stringing results in increased or decreased tension, as the wire is forced down or up. The arrangement arrived at gives the minimum vertical-wire displacement of all combinations studied.

The study of wire displacement would be meaningless unless the position of the wires at control points (saddles) is definitely fixed; hence, the introduction of "fillers" at the saddles. The fillers are made of zinc castings and conform to the exact shapes of the voids in which they are placed.

It was found with the 10-ft.-long full-scale model cable of the Golden Gate Bridge, which the contractor made and compacted, that a circular section of the required diameter was obtained with much less compacting pressure than was required on the George Washington Bridge cable, which indicates less resistance to "flow" of wires; therefore, either less motion, more direct or natural travel, or probably a combination of the two, is indicated.

Observation in the field to date (cables 75 per cent completed) shows that there is little or no roll to the cable resulting from unequal temperature distribution, thereby justifying the venting, which is practical only in the "straight-sided hex."

FIG. 3—MID-SPAN TRANSFER STATION with triple spinning wheels approaching from opposite directions. After wires are transferred, each wheel retraces its route.



### Stringing speed 60 per cent greater required

A review of the construction time requirements of the four largest sets of bridge cables erected or under erection to date shows that the speed of erection of the Golden Gate Bridge cables had to be about 62 per cent greater than any of these and some 96.5 per cent faster than on its neighbor, the San Francisco-Oakland Bay Bridge. As some of the bridges have only two cables while others have four, a fair method of comparative time studies is on the basis of tons of wire per cable per eight-hour day.

The accompanying table indicates to the best of our belief the tonnage time requirements as called for in the specifications. The time given is elapsed time from the date the contractor receives the towers and anchorages ready for cables until the suspenders are hung and ready for the floor steel. The contract time given is total time and, to arrive at ac-

**Relative Cable Construction Speeds Required**

| Bridge | Tons of Wire per Cable | Cont. Time; Mo. | Tons per Mo. | Speed Factor, % |
|---|---|---|---|---|
| Delaware River..... | 3,313 | 9 | 368 | 100 |
| George Washington | 7,125 | 15 | 475 | 129 |
| San Francisco Bay. | 4,775 | 12 | 398 | 106 |
| Golden Gate..... | 10,750 | 14 | 768 | 209 |

tual stringing time, we must deduct the time required by the contractor to erect his footbridge and stringing equipment, compact, place cable bands and hang suspenders. As a basis of comparison only, we have assumed that this deductible time is the same in all instances, where, as a matter of fact, it is reasonable to suppose that it would require a longer period of time to prepare for the stringing of a 7,760-ft. cable than it would for a 3,540-ft. cable. With this taken into consideration, the speed-factor requirement on the Golden Gate Bridge would be considerably higher. This requirement for speed compelled the contractor to devise way and means of bettering his previous stringing record made on the George Washington Bridge.

### Great tonnage increase

The *Engineering Record* of Dec. 5, 1908, in speaking of the Manhattan Bridge, says, "The largest number of wires laid in one cable in eight hours was 218. The largest total number of wires laid in one day is 812 divided among the four cables and weighing together about 131 tons" (approximately 33 tons per cable per day). This was in the winter of 1908-09. In 1924-25 we find the cables of the Delaware River Bridge being strung at practically the same rate. On the George Washington Bridge cables, strung in 1929-30, the stringing rate was increased to approximately 61 tons per cable per day, whereas on the Golden Gate Bridge this figure has jumped to the gratifying total of 271 tons—an actual increase of 444 per cent over the George Washington Bridge and 820 per cent over the rate on the Manhattan Bridge.

To get this increased production rate, the contractor had to choose between the expedient of two or three shifts per day, or increasing his hourly production rate; the contract price made the choice of the latter expedient imperative.

### Progressive steps in increasing stringing speed

Up to the time of the George Washington Bridge, it was generally conceded that the speed of the spinning wheel—the life blood of production—was limited to about 450 ft. per minute. This limitation was fixed by two factors: first, with the gooseneck carriage and supporting-sheave arrangement in general use, any further increase in speed would cause the carriage and hauling rope to jump out of the supporting sheaves; and secondly, the reels of bridge wire could not be positively controlled at a higher rate of speed with the manually-operated brakes that were then in vogue.

On the George Washington Bridge the contractor overcame the former difficulty by introducing a straight hung carriage and an enveloping split-sheave assembly. The second limitation was overcome by substituting power-driven and power-braked reels for the hand-operated ones, and by the further addition of counterweighting the wire leading from the reel to the spinning wheel, thereby keeping the wire under constant tension and allowing synchronization of the speed of the spinning wheel and the peripheral speed of wire reel mounted on the anchorage.

These improvements permitted increasing the speed of the spinning wheel to 650 ft. per minute, and this, together with the introduction of power-driven, remote-controlled come-alongs for wire adjustment and better supervision of the work through an improved central dispatcher's office and a more highly developed signal and communication system, increased the stringing rate about 85 per cent over that previously obtained.

### Double spinning wheel

Still looking for increased production rate, the contractor studied the possibility of placing another spinning wheel on the carriage, since it was not advisable to increase the speed further because of mechanical limitations, abuse to the bridge wire and safety of operation. This was not as simple a step as at first appears because a double wheel meant that the wires going into one strand would come from two reels, and this introduced the problem of crossed wires.

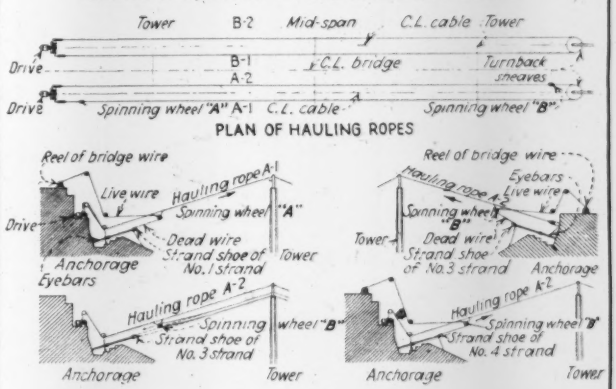
Crossed wires may or may not be objectionable depending upon where the crosses occur: in the saddles, wire nicking resulting from crosses would be slightly detrimental, elsewhere not so bad. Then too, there was the possibility that the wire adjusters along the span would become confused, with double the number of wires to adjust for each trip of the wheel, and might lose enough in adjusting time to offset the saving in the stringing time. However, it was decided to give the double wheel a trial, and on the last strand spun into the cables of the George Washington Bridge the double wheel was tried and found successful.

During the interval between completion of the George Washington Bridge cables and the commencement of the Golden Gate Bridge cables, the contractor evolved another scheme which would again practically double the production rate of the two wheel carriage or quadruple the rate of the George Washington Bridge stringing.

### Double or split tramway

The idea was a double tramway, split at mid span and with a wire transfer station at that point. A reference to Fig. 8 will simplify the explanation of this procedure. Instead of having one

**CABLE SPINNING IN ITS SIMPLEST FORM**



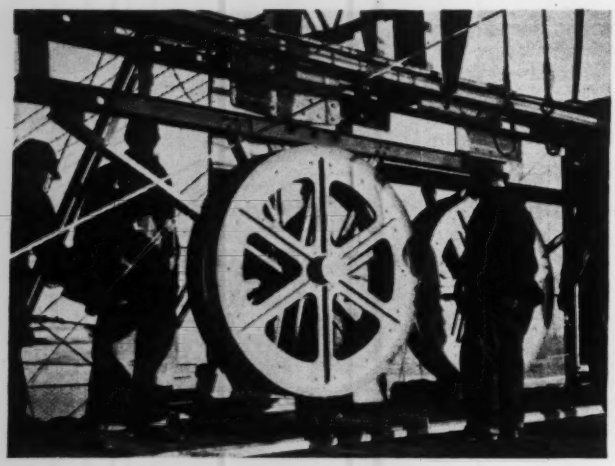

**TWO ENDLESS HAULING ROPES, A and B, one on each footwalk, are used in the usual spinning operation. Referring to tramway A (since both A and B are identical), it will be seen to consist of an endless hauling rope reeved from one anchorage to the other around a turnback sheave. The rope is driven by a reversible winding machine (drive) and is supported at the tower tops and at intervals along the footwalks by hold-up and hold-down sheaves. Attached to the rope are two carriages to which are attached the spinning wheels. The carriages are so set that one is at the near anchorage while the other is at the far anchorage.**

**● The wire is delivered to the two anchorages on large reels which are mounted on unreeling machines. With a wheel in the anchorage, the end of the wire is led from the reel, around the spinning wheel and strand shoe, and temporarily made fast. The same operation is carried on simultaneously at the other anchorage, and the wheels are ready for their first trip. They proceed in opposite directions across the span, pass at mid-span and arrive simultaneously at the far anchorages.**

**● The reels all the while are paying out wire, or a bight of wire —one "dead" or fixed part and one "live" or moving part. As the bight of wire falls on the footbridge behind the spinning wheel, the dead wire is placed in its adjusting position immediately, and the live wire is supported by sheaves or rollers until the wheel stops at the far anchorage, at which time the loop is removed from the wheel and placed around the open strand shoe. Both parts of wire are then adjusted to the proper sag. In the meantime another bight of wire from another reel is placed around the wheel, and the hauling rope reverses its travel.**

**● Four strands are strung at a time. In traveling from left to right wheel A always carries wire for No. 1 strand. From right to left it feeds strand No. 2. Wheel B, in traveling from right to left, feeds No. 4 strand and from left to right No. 3. Thus, all wire for any given strand originates from the same reel. When the required number of wires for a strand has been strung and adjusted, the last end of wire is spliced to the first end, which up till now has been temporarily anchored; the result is an endless skein of wire which constitutes the strand.**

**● When the four strands, comprising one set-up, are finished, they are compacted into a circular section, served from end to end, adjusted, and put away in their final position in the main cable.**



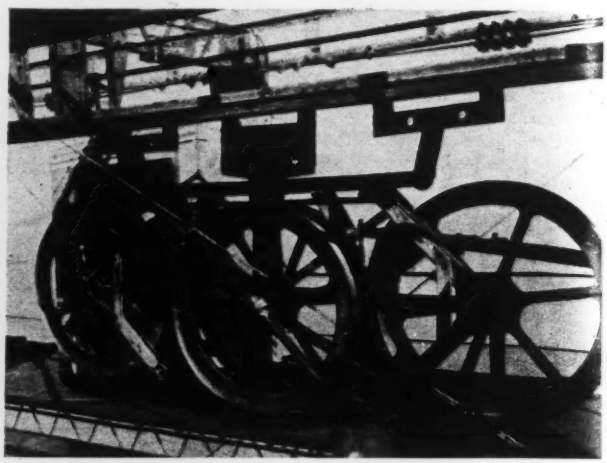


FIG. 4—EVOLUTION IN SPINNING WHEELS. Two double wheels are shown (above left) meeting at the mid-span transfer station; with this equipment in combination with the double tramway, sixteen wires were placed in the cable simultaneously. The triple wheel (right above) increases the number of wires to 24.

FIG. 5—A NEW DEVICE—A strand holder (right) is used with the new "vertical tier" cable to keep all wires at a uniform temperature by free circulation of air.

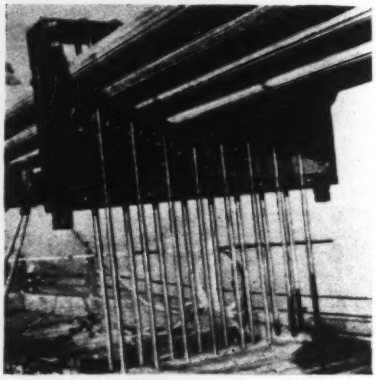


FIG. 6—FLAT WIRE STRAPS (left) form a cradle for the strands as they are lifted from spinning position into the saddle. The straps are sheared off and left in the cable.

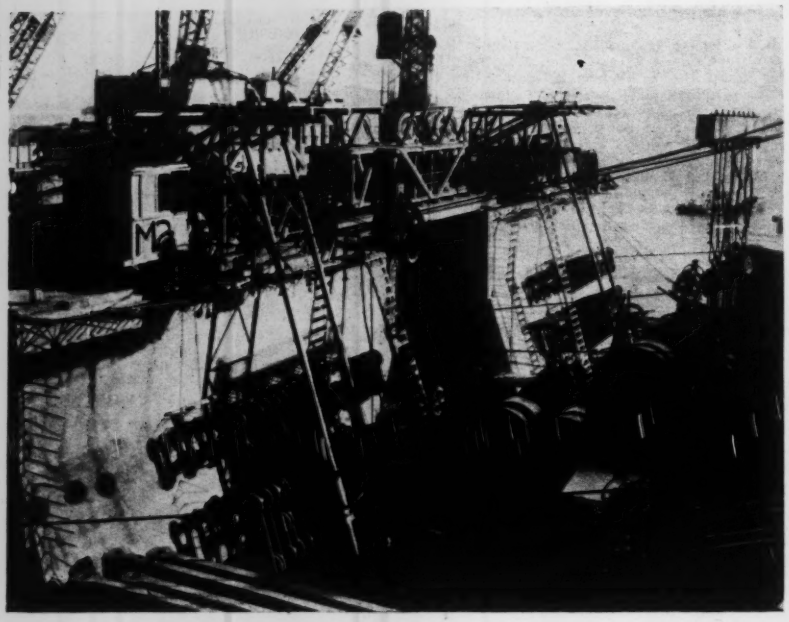


FIG. 7 — ANCHORAGE OPERATIONS and equipment (below and right) on the Golden Gate Bridge cable spinning. A spinning wheel is just leaving the anchorage in the right view.

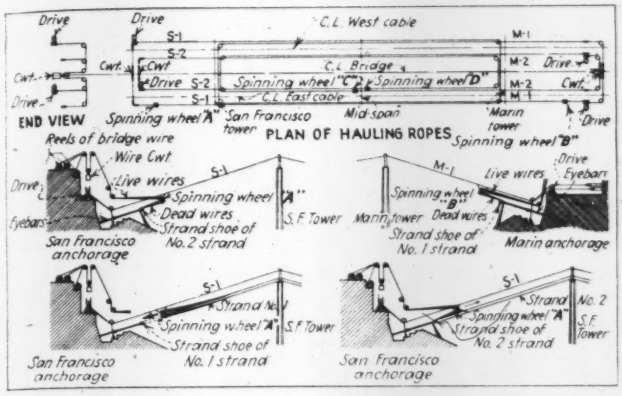



FIG. 8—CABLE SPINNING PROCEDURE (left) on the Golden Gate Bridge is characterized by two tramways each running from an anchorage to the far tower, and by multiple spinning wheels. The above diagrams are based on the use of a double wheel.

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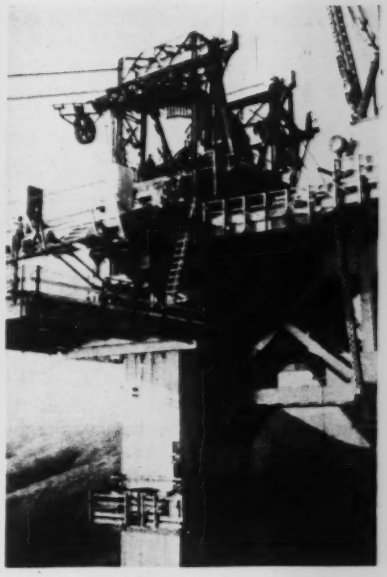


FIG. 9 — TOWER-TOP operations as one of the double spinning wheels approaches.

endless hauling rope from anchorage to anchorage and return as in all previous installation there is a rope which extends from one anchorage to the far tower and return (M-1) and another rope, S-1, which extends from the other anchorage to its far tower and return. Theoretically, neither of these two ropes need extend but slightly beyond mid span, for they do not carry their respective groups of spinning wheels beyond that point, but weight considerations on the footwalks and structural and mechanical details dictated the advisability of mounting the return sheaves on the far towers.

### The operation in detail

Spinning wheel *B*, mounted on rope M-1, leaves the Marin anchorage the same time as its mate, spinning wheel *A*, mounted on S-1, leaves the San Francisco anchorage. Traveling at a speed of about 650 ft. per min., they meet at the mid-span transfer station in about 6½ min., where the wires from S-1 are transferred to M-1 and vice versa. The transfer consumes about 30 sec., after which the two tramway drives are reversed, M-1 returning to Marin with the wires from San Francisco and S-1 returning to San Francisco with the wires from Marin.

This, in effect, cuts the time of travel in half or virtually doubles the speed of the spinning wheel.

The equipment described as M-1 and S-1 is duplicated on the far side of the main cable in M-2 and S-2. Thus we have four sets of carriages feeding wire to one main cable rather than two. With a double wheel on each carriage 16 wires are delivered from the anchorage in the same interval of time, which, using George Washington Bridge practice, would have delivered only four. The production thus is quadrupled.

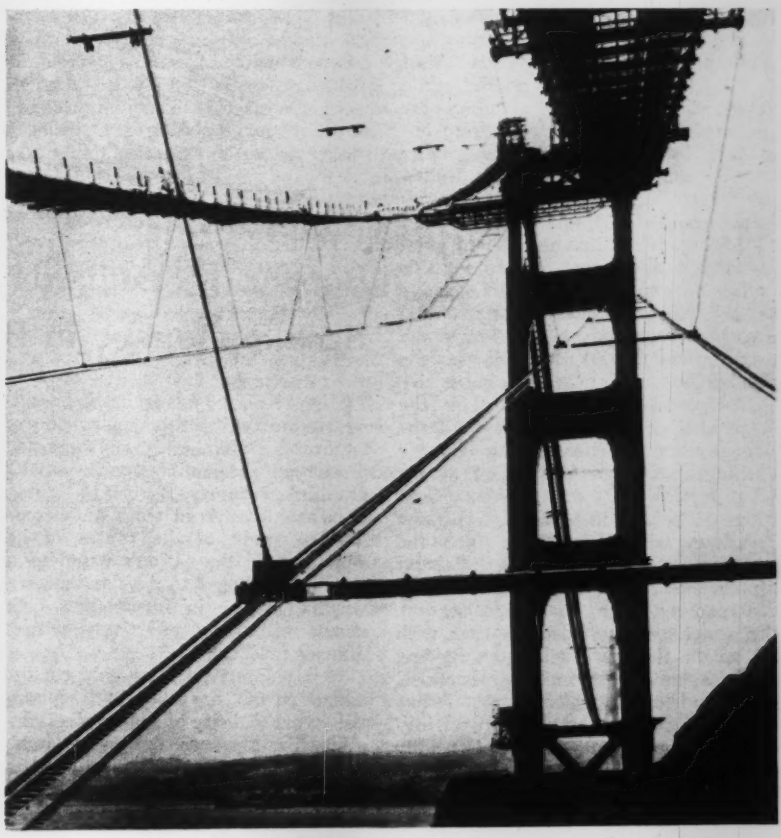
With 16 wires on the walk to adjust, rather than four, the adjusters would become hopelessly lost were not the wires distinguishable in some manner. Therefore, the wire on one of the two reels feeding a carriage is sprayed with a distinctive color and this color together with the placing of wires in their proper guides and positions as the wheel passes each particular control point, enables the adjusters to keep them identified.

### Twenty-four wires instead of four

It would be well to point out here that the workers on the Golden Gate Cables are an amazingly intelligent, resourceful and loyal group of men. Most of the supervisors and the key men are experienced cable workers, but the majority of the men are working on their first cable job. Nevertheless, so thorough and speedy was their work that after some two months of stringing it became apparent to all that the addition of a third wheel to each carriage was not only possible but obviously the thing to do. So today in the equivalent of one trip of the wheels, twenty-four wires are being laid rather than four, giving a sixfold increase over the George Washington Bridge.

That each cable of the Golden Gate

FIG. 10—STORM SYSTEM of bracing cables for the Golden Gate footwalks. The catenary system that carries the tramway (in lieu of the usual timber or pipe bents) also serves as windbracing. The footwalks of redwood timber rest on twelve prestressed ropes (not suspender ropes) that serve as stringers.



Bridge contains 1.5 times the tonnage of wire of its next rival, the George Washington Bridge, is some evidence of the work cut out for the contractor. The main span increase of 700 ft. or 20 per cent, an overall increase in cable length of 2,548 ft. or 49 per cent, and an increased tower height of 151 ft. or 25 per cent necessitated by far the loftiest and longest footwalks ever erected. In addition, the geographical location of the bridge and its exposure to winds are other factors measurably effecting the erection problems.

### New footwalk design

In placing the footwalk cables, the tides caused some difficulty, but the procedure followed was the usual one of laying them on the bottom and then hoisting clear. The footwalks themselves are not supported by the afterward-to-be suspender ropes, but by prestressed bridge strands made expressly for the purpose. The reasons for this are manifold. It eliminates the use of permanent bridge material in a temporary service that might damage it. It reduces the weights to be handled since the ropes used weigh only 5 lb. per foot as against 12¼ lb. per foot for the suspenders. Thus one main span length of footbridge strand weighs 21,000 rather than 51,450 lb.; also the "pull-home" load on the hoisting equipment was reduced to 35,000 as against 89,000 lb. Another saving in weight of the footwalks was made by spreading out twelve strands on one and thirteen on the other and utilizing the strands as stringers.

Perhaps the most potential factor of all was the saving in overall time through eliminating the necessity for removing the suspender ropes from under the footwalks and cutting and socketing them in the field. The Golden Gate Bridge suspenders are being prestressed, marked, cut, socketed and reeled at Roebling, N. J., in a permanent plant especially designed and erected for this purpose. Upon arrival at the bridge site they will only have to be re-reeled on to the erection reels, hoisted to the tower top and placed in position on the cable bands.

The geographical position of the bridge also governed the design of the storm system. Whereas the George Washington Bridge is parallel to the prevailing winds, the Golden Gate Bridge is broadside to them. Also the prevailing winds sweeping into the Golden Gate strike the high hills and cliffs to the north, so that eddies and even perpendicular gusts are set up. The system, as was also the case with that on the George Washington Bridge, was the result of exhaustive model studies and lengthy calculations. It has proved effective, allowing wire stringing and adjusting to go forward steadily with winds ranging 40 to 45 m.p.h. Above that velocity, men find it difficult to stand up.

Another geographical factor to be reckoned with is the famous San Francisco fog. To overcome this difficulty the most elaborate signal, communication, and control systems yet devised are employed. These, together with the remote control power come-alongs which permit wire adjusters at mid span to control their wire motion at the tower tops and anchorages, allows stringing to proceed without undue interruption.

### Tramways carried on catenary

It has been general practice in the past to support the tramway sheaves along the span by means of bents or frames. These bents add unnecessary additional weight to the footbridge ropes, are rigid and provide no cushioning to the impact of the spinning carriage as it passes through the supporting sheaves. On the Golden Gate Bridge, therefore the tramway sheaves are supported by an independent, overhead catenary system, which not only reduces weight and provides cushioning, but also makes for greater stability of the footbridge and storm system. When spinning is completed, this overhead catenary will be used as a cableway system for handling compactors, cable bands, suspenders and wrapping machines.

### Strand lifting bands

The adoption of new strand lifting and serving devices at the tower tops has greatly facilitated strand adjustment. The strands are lifted in a cradle of ductile, high strength, flat wire straps which are in turn carried by a lifting beam hoisted by two hydraulic jacks. With this combination and by skillfully manipulating the jacks, the beam can be so "teetered" that strand movement (lengthwise) of ⅛ in. can be secured. The lifting bands are sheared off and left in place. The serving band tightening devices are left in place until the adjacent strands are ready for placement at which time they are removed. Thus the strand shape is controlled until the fillers are in place, and no wire in any one strand loses its identity with that strand.

A novel feature of the general plant is the introduction of "escalators" on the steeper sections of the west footwalk. This walk is wider than the east walk and along side of the handrail is a running rope driven by a grip-wheel at the tower top, which the men grasp in making the ascent. Safety noses prevent hands from running into the supporting sheaves. The "escalators" have proven popular and are great time and back savers.

In general all innovations have lived up to expectations. The men have adapted themselves to the new equipment and methods with marked rapidity and skill. One set of four strands each is being completed every 24 working hours.

### Personnel

For the John A. Roebling's Sons Co. which is building the Golden Gate cables, C. C. Sunderland is chief engineer of the bridge department, Walter E. Joyce is resident engineer, Robert J. Cole, general superintendent and Grover McLain and Paul Hendrickson assistant superintendents.

The bridge is being built by the Golden Gate Bridge and Highway District for which Joseph B. Strauss is chief engineer and Russel G. Cone, resident engineer. A consulting board consists of O. H. Ammann, Charles Derleth, Jr., and Leon S. Moisseiff.

# Bureau of Standards Studying Back-Siphonage in Plumbing

TO MEET an increasingly grave condition and at the request of manufacturers, plumbers and engineers throughout the country, the National Hydraulic Laboratory, Bureau of Standards in Washnigton is at work on a comprehensive study of the causes of back-siphonage in the nation's plumbing systems. It is hoped to develop data which will be of use in formulating definite means of coping effectively with this difficult problem.

It is planned to investigate conditions which permit or cause back-siphonage, the layout and size of supply pipes, fluctuating line pressure, design of plumbing fixtures, the design and form of installation of control valves, limits of vacuum needed in applying the corrective measures, special devices or appliances which are designed to protect supply lines from back-siphonage, and, in short, all corrective measures possible.

An appeal has been made to all interested in the problem, and the laboratory is now in receipt of a number of offers of aid from private sources. These offers will be utilized if they can be made to fit into the general scheme of the program.

Assurance is made that any device or material supplied the laboratory for the study will be used only for research and investigation, and that no tests for compliance with any specification or standard will be made.

A full report of the results of the study will be published as soon as the work is completed.

# Design and Theory of the Discontinuous-Web Girder

By J. C. Meem
*Civil Engineer,*
*Brooklyn, N. Y.*

AT THE BEGINNING of work on two sections of the Eighth Ave. subway in New York City by the Cranford-Locher Co., in 1925, it was decided to use a special type of girder for supporting the temporary street decking. As finally developed, this girder was of the discontinuous-web type, designed to give a maximum of efficiency, strength and lightness, combined with opportunity to pass pipes and sub-surface structures at intervals through the webs. A standard girder 32 in. deep was made up of 30x32x¾ in. webs spaced 60 in. on centers and four chord angles 6x8x⅝ in., generally in lengths of 40 ft. The girders were furnished completely fabricated for the blocks between streets, and knocked down in lengths of 20, 30 and 40 ft. for bolting up at the cross streets. They were designed for a lateral spacing of 14 ft. and were supported by heavier cross girders at 20 foot intervals, posted up from the bottom. Actually the girders were designed for emergency duty of double the 20-ft. span, and in the exigencies of the work and the occasional loss of support from blasting, they were not infrequently loaded to capacity. A test was made of a group of these girders and one of them was loaded to 103,000 lb. on a span of 38½ ft. with a sag of slightly under 1 in. The failure of one abutment prevented carrying this test to higher loadings.

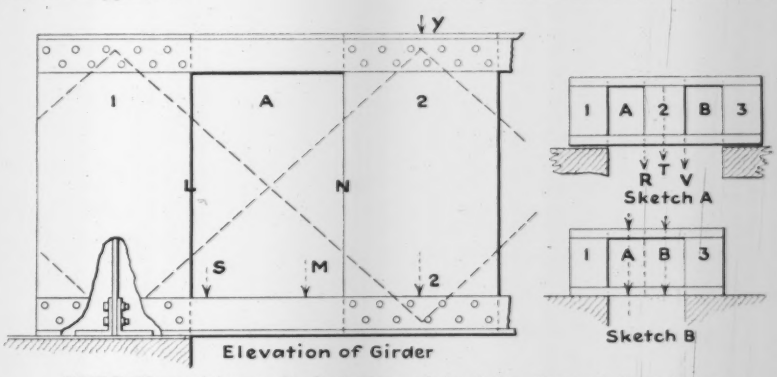
After the removal of these girders from the work, a large number of them were used successfully on other contracts, particularly by the Del Balso Construction Co. on a subway section in Brooklyn. Here they were used not only as deck and bracing girders and as bridging for long span overhead gas pipes, but were especially useful in bracing across the excavation at the site of a large storage warehouse which adjoined the subway.

## Design theory

As to the theory of the design of this girder, there has been considerable discussion and some controversy.

It is obvious that in any rational design the section modulus will be the product of the area of the four chord angles by their radii of gyration. If the plates are spaced close together, no economy of design will result, whereas, if they are spaced too far apart, the girder will be weakened. For practical purposes, then, the determination of the economic width of plate spacing is an essential factor.

A theory that has been advanced is that this determination is governed by the cantilever strength of the four chord angles for the length of the space A or LN, in the accompanying sketch. In other words, the resistance to ⅛ of the total load applied on each angle, at an assumed free end and at a distance LN, determines the equivalent safe loading for the whole girder. This seems manifestly unfair, as the chord angles cannot be considered as having free ends but must be considered structurally. Thus, if the girder be cut away to the right of plate 2 and one-half the load be applied there, the resistance modulus will be that of a cantilever girder with the top chords in tension and the bottom in compression rather than of four cantilever angles with the loads at their assumed free ends a horizontal distance *A* from the support.




SKETCHES pertaining to the development of the design theory of discontinuous-web girders.

It may, however, be assumed that since a vulnerable link is the width of the spacing *A* at each end of the girder, that the portion of the girder between may be eliminated or reduced to zero; that is, the width of the plate 2 in the small sketch *A* is theoretically reduced to zero, except for its function of distributing load between top and bottom chords. This is more clearly shown in the second small sketch *B* where plate 2 is eliminated and the load carried by the four chord angles, each having a length of A plus B or 2A.

For example, assume a girder with 6x8x⅝ in. angles and 30x32x¾ in. web plates in which L, total load on the girder = 250 lb. per ft.; *l* length of the girder between supports = 40 ft.; and P, open panel length A or distance between discontinuous plate = 2½ ft. Also assume a steel unit stress (in temporary work) of 20,000 lb. per sq.in. Then M, the section modulus of the girder, is 420; *m*, the section modulus of one of the angles, is 9.9; and the safe load on the girder is 140,000 lb.

For the open panels, we find P = 1.88, with the maximum loading of 140,000 lb. for the whole girder. As this is only 75 per cent of the total 2½ ft. used, it indicates that the girder was capable of carrying a safe load of only 75 per cent of the allowable maximum of which it would have been capable had the spacing between plates been reduced to 1.88 instead of 2.5. This factor however was still considerably in excess of the 60 per cent restriction placed by the Board of Transportation engineers on this girder.

In view of the fact that these girders were supported ordinarily at 20 ft. intervals, it can readily be seen that the ultimate factors were available and necessary for emergency conditions only, and in assuming the full load, the metal of the 2½ ft. open panel spacing would have been stressed to 26,000 lb., and for a short period only.

The formula for panel length, P, for a maximum loading is

$$L \times 1\tfrac{1}{2}\,(P + P) = 4\,m \times 20{,}000$$

With L = 140,000, P is found to be 1.88. With P = 2.5, L is 105,000.

It is probable that a more efficient and economical girder for the above conditions would be one having 6x6x⅝ in. chord angles with ⅝ in. plates 15 in. wide and 30 in. deep, spaced 30 in. on centers. A model of such a girder to a ⅛ scale was made and tested at the Brooklyn Polytechnic Institute. In this model the spacing between plates or P was reduced to a minimum. The result of the test was as computed, the stress in the metal at the point of failure being 33,000 lb. The prime cause of the initial failure was due to lateral deflection. No benefit appeared to be derived from reducing P beyond 15 in.

In this discussion no account has been taken of shear in the chord angles at the end panels, since it is usually in excess of the requirements. The strength of the individual angles under the conditions noted is also in excess of the requirements, even if it be assumed that one-half the whole distributed load be placed on the top or bottom angles of any panel. That is,

$$1\tfrac{1}{2}\,P \times 70{,}000 = m \times 20{,}000 \times 2$$

$$\text{or } P = \frac{9.9 \times 40{,}000}{105{,}000} = 3.75$$

or 50 per cent over the maximum used.

# Welding At Fort Peck Keeps Equipment At Work

## Dredges, tractors, trucks, shovels and cranes receive first aid in modern welding shops operated 24 hr. a day by 115 men who are using 3 tons of welding rod weekly

By T. B. Jefferson, Assistant Engineer.
*U. S. Engineer Office*
*Fort Peck, Montana*

IN BUILDING the 100,000,000 cu.yd. earth-fill dam at Fort Peck, Mont., a tremendous amount of equipment is required that must receive continual and prompt maintenance if maximum performance is to be obtained. Furthermore it is highly important to have means available at the site for rapidly repairing and renovating the worn parts of the four 28-in. electric dredges and the numerous draglines, tractors, trucks and other equipment that make up the government owned plant of the army engineers. Welding has proved to be a most valuable tool for the purpose.

In developing the plans for welding operations, it was obvious that, because of the distance of Fort Peck from sources of supply for equipment parts, the welding demands would frequently be unusual and the work extremely diversified. Due to the variety of the work to be performed and the inability to obtain authoritative information covering the problems at hand, it was decided to make a thorough study in order that welding methods most suitable to the conditions encountered could be devised.

### Selecting welding rod

These studies and later observations under working conditions developed the specific uses to which either the oxy-acetylene or the electric arc welding processes could be applied. For use in gas welding numerous commercial rods with desirable physical and welding characteristics were available for the proposed work, and these rods presented no particular difficulty. For use with electric welding it was found that the heavily coated electrode, in most cases, was far superior to either the dust coated, rust coated or the bare electrode. However, it was difficult to find a coated electrode that possessed all the desirable characteristics necessary for good welding. Frequently the electrode that produced a weld of high tensile strength was lacking in ductility. In other cases the deposit would be porous because of gas inclusion, the fusion improper because of poor penetration, and oxidation and splattering would result because of improper shielding.

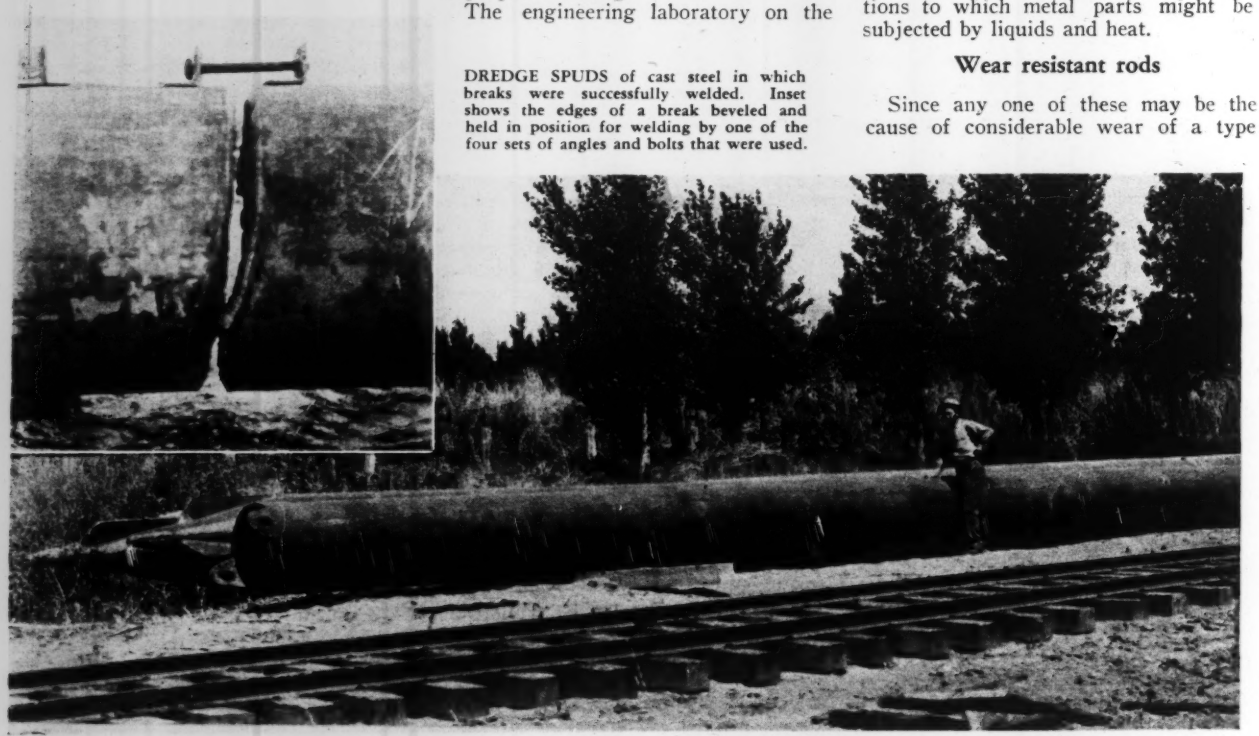
The engineering laboratory on the project was of considerable assistance in the selection of the proper welding rod since it is equipped to make complete physical tests. With the aid of this equipment it was possible to determine the yield point, ultimate tensile strength and ductility and to make metallographic examinations of weld specimens. In the shop the rods were given practical tests to determine the various welding characteristics such as ease of application and smoothness of the deposited bead.

By these tests it was determined that the electrodes meeting the Navy specifications possessed all the desired qualities necessary for a good electric weld and electrodes of these specifications were selected for general purpose work, i.e., the welding of rolled, pressed or cast steel parts daily encountered in the job shop.

Much of the welding work at Fort Peck consists of the reclaiming of dredging equipment, including cutter blades, dredge pump casings and impellers; also excavating equipment parts, such as dragline bucket lips and teeth, road grader teeth, grader blades and bulldozer blades. These parts are continually subjected to abnormal wearing conditions which may be classified in four groups: (1) Abrasion, the grinding action due to the abrasive materials such as rocks and sand sliding, rolling or rubbing against the surface of the metal; (2) Erosion, the scouring action of silt- and sand-laden waters traveling at high velocity; (3) Impact, the light and heavy blows tending to deform the surface and cause cracking and chipping; and (4) Corrosion, the rusting, oxidation and other chemical actions to which metal parts might be subjected by liquids and heat.

### Wear resistant rods

Since any one of these may be the cause of considerable wear of a type



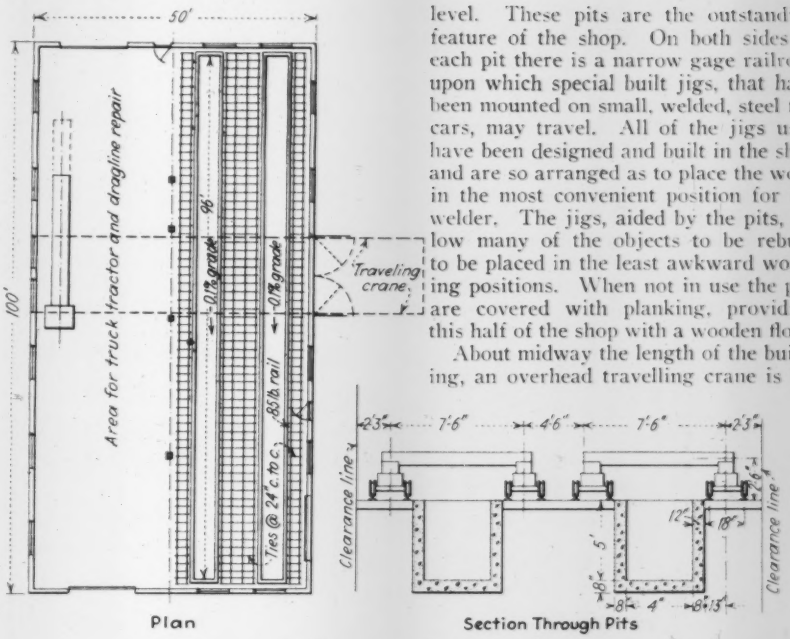
DREDGE SPUDS of cast steel in which breaks were successfully welded. Inset shows the edges of a break beveled and held in position for welding by one of the four sets of angles and bolts that were used.

which the general purpose welding rod is unable to overcome, a new problem arose—that of finding a welding rod particularly suited to resist wear. The possibility of solving this problem by the oxy-acetylene welding process was quickly eliminated since most of the wearing parts of excavating and dredging equipment are either steel or manganese steel castings and both of these materials have tendencies to warp readily when heated. Electric welding was therefore the answer, and it was necessary to select one of the many existing types of commercial hard-facing electrodes.

After a study of the various types of hard-facing rods it was found that they could be grouped into one of three classes: (1) The alloy group consisting of rods having an iron base and containing chromium, manganese, molybdenum, nickel and silicon; (2) the non-ferrous group made up of alloys of chromium, cobalt and tungsten; and (3) the diamond substitute group so-called because the tungsten carbide used approaches the diamond in hardness.

Deposits from the first group of hard-facing rods may be either of the martensitic or the austenitic type. Martensitic deposits exhibit their full hardness in the initial deposited state; that is, their hardness shows little or no increase upon cold working. The higher the hardness of the martensitic deposit the better is its ability to resist abrasive wear and deformation, and the less its resistance to impact and chipping. Austenitic deposits, commonly called self-hardening, differ from martensitic deposits in that they are relatively soft as deposited and have the property of hardening at the surface when deformation takes place in cold working. The rest of the deposit remains relatively soft, and consequently this type is suited for use in resisting impact wear. Deposits of the second group are of the martensitic type, while the deposits of the third group differ distinctly from both of those mentioned as they are of a matrix type. The third group consists primarily of rods made up of sharp irregular tungsten carbide particles uniformly distibuted in a tough alloy steel binder, so that when deposited the particles become firmly embedded in the strong alloy base metal and are capable of withstanding extreme abrasive action.

With the various types of hard-facing rods classified into groups most suitable for use under various conditions, practically everything but the proper application technique seemed to have been solved. However, this was not true in all cases, for occasionally the rod that should have been the best suited for a hard-facing job proved to be the least effective, and that which had proved itself technically to be improper for use, under certain conditions did the job well. This was particularly true in the hard-facing of pump impellers; in this application a martensitic deposit should be ideal but experience has shown that a self-hardening deposit offers the greatest resistance to erosive wear.




**LAYOUT of main welding shop at Ft. Peck. On the right side the rail car jigs span pits which permit pieces to be welded to be lowered below floor level, as an aid to the workmen. In some cases the pit is filled with water to dissipate the heat of welding.**

## The welding shops

Welding activities are carried on mainly in two shops; a small one, where routine jobs such as building tanks and other light welding work is performed, and a larger shop for the heavy welding. Also, during the dredging season, two barges located in the vicinity of the dredges are fitted out and used as floating shops.

The shops are served by a modern acetylene generating plant, and by twenty 300- to 600-amp. electric arc welding machines. Operations are carried on continuously 24 hr. a day and require an average of 115 workmen, thereby making the welding department the largest of the engineer shops. Of these 115 employees, 70 are qualified as welders. The qualification tests require that the applicants be capable of producing welds showing good welding and high physical characteristics. These test welds must withstand an average tensile stress of more than 60,000 lb. per sq.in. for the three welding positions; that is, flat, horizontal and overhead.

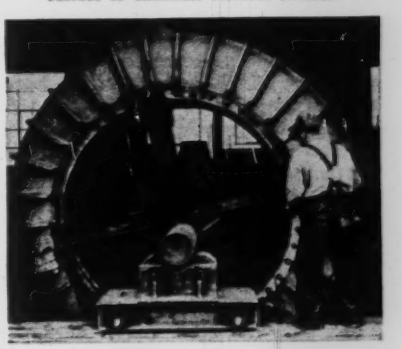
Since much of the work to be done calls for the rebuilding and refacing of heavy equipment, the larger shop was designed in a manner to facilitate the handling of this type of work. The shop consists of a building 50x100 ft. in plan divided into two halves. One side has a dirt floor, so that tractors, draglines, trucks, etc., may be driven in for repairs. On the other side most of the floor space is taken up by two long pits, about 4 ft. deep, placed below the floor level. These pits are the outstanding feature of the shop. On both sides of each pit there is a narrow gage railroad upon which special built jigs, that have been mounted on small, welded, steel flat cars, may travel. All of the jigs used have been designed and built in the shop and are so arranged as to place the work in the most convenient position for the welder. The jigs, aided by the pits, allow many of the objects to be rebuilt to be placed in the least awkward working positions. When not in use the pits are covered with planking, providing this half of the shop with a wooden floor.

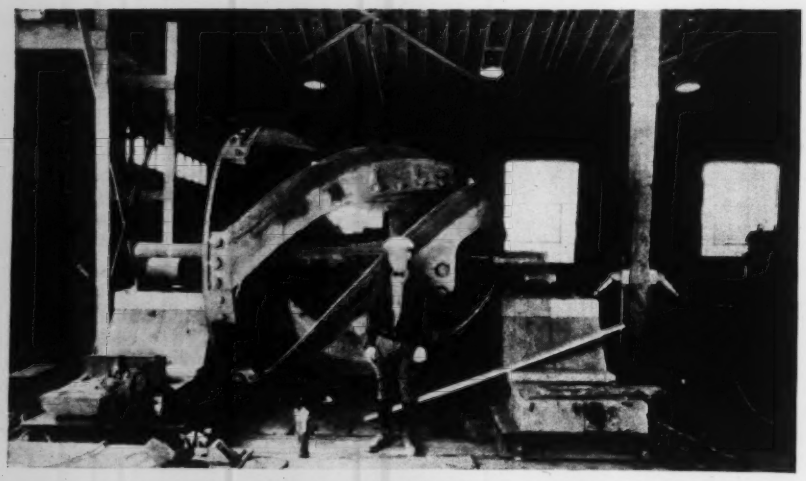
About midway the length of the building, an overhead travelling crane is installed, which is designed to serve both sides of the shop and also an area outside and adjacent to the shop used for loading and unloading. One of the accompanying illustrations shows the floor plan of the shop and also a cross section of the pits. The overhead crane, with the aid of the small cars, which are pulled along the narrow track by means of compressed air operated winches, makes it possible to move the heaviest equipment to any place on the pit side of the shop.

## Dredge repairing

Dredging is being carried on under the severest of operating conditions, since the material passes through 5 pumps and from 12,000 to 17,000 ft. of pipeline before being deposited in the fill. Likewise these materials are being pumped at high pressures and velocities, causing extreme wear on the pumps, particularly the pump case shoulders and the im-

**DREDGE PUMP CASE suspended in a water-filled pit from jig. Welding is carried on an inch or two above the water surface to eliminate residual stresses.**





DREDGE CUTTER BLADE mounted on jig in Ft. Peck welding shop. This 9-ton piece has been hard-faced by welding for working in highly abrasive sand.

pellers. As these 28-in. pumps will operate only about 25 days before their worn condition results in a serious loss of pumping efficiency, their rebuilding represents a major part of the repair work handled in the main shop.

When a pump case is to be rebuilt it is taken into the shop by the overhead crane, where it is then fitted with an axle and spoke type jig, making a large wheel with the case as a rim. The case so fitted is then suspended in one of the floor pits by resting the axle on dollies which are supported by flat cars on opposite sides of the pit. With the pump case so arranged, its lower section is below the level of the floor, making the work easily accessible to the welder. Further, since the case can be rotated at will, the part of the case on which work is being performed is always at the bottom, where welding can be done in the flat position.

The particular pit that is being used in the welding of the cases is always partly filled with water so that the case is immersed to within one or two inches of the point where welding is being done. By this means any undue heat that might be accumulated in the case during welding is readily dissipated, thus minimizing the possibility of warping.

When the shoulders are built up to within about ¼-in. of their finished height they are ready for hard-facing. Considerable care must be exercised during this operation, to avoid the formation of blowholes, roughness, or other conditions that might permit the abrasive material to cut away the base metals, thus allowing the hard-facing material to be undermined before serving its purpose. After the shoulders have been rebuilt the jig is removed and the pump case is placed on its side on two of the small flat cars, the cars being on opposite sides of one of the pits. With the case so placed the welder begins building up the sidewalls of the casing, and as soon as the worn places on one side are filled the case is turned over for the rebuilding of the other side. This is done so that the men may weld in the flat position as much as possible. Upon completion of the welding the case is ground to size and is then ready for service after about three weeks of steady rebuilding work.

The pump impellers are also rebuilt in a jig which permits their being rotated so that the welding can be done in the flat position. The jig used is mounted on wheels and travels along the rails beside the pits, the center section being dropped to accommodate the impellers. This arrangement lowers the impellers into the pit enough to bring the top within easy reach, so that the workman can do all the welding at this point by rotating the impeller. Most of the rebuilding is done with a self-hardening type electrode, care being taken to lay the deposits across the flow of water rather than with it. Beads deposited crosswise tend to resist the erosive action of water travelling at high velocity, while beads deposited parallel to the flow permit wear to take place at the junctions of the several beads.

In order to eliminate any unnatural stresses caused by welding on the pump cases, impellers or other welded pieces where one bead is applied over another, the work is stress-relieved by peening each successive layer with air operated chipping hammers.

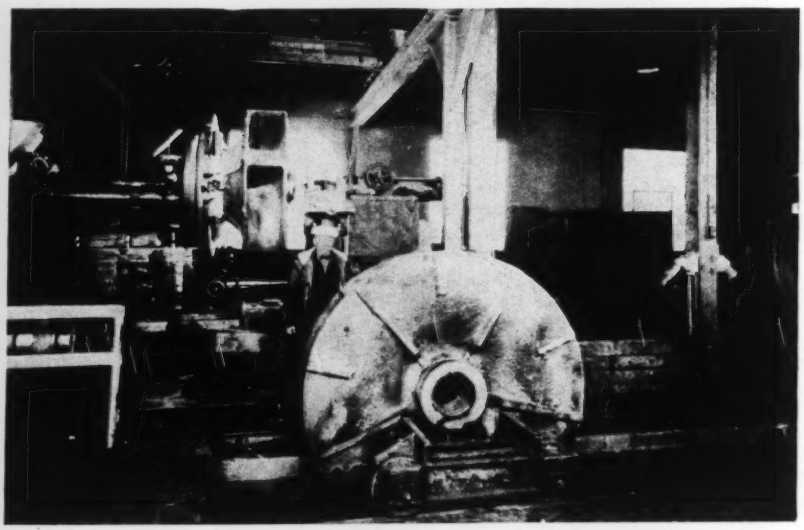
The hard-facing of a dredge cutter blade or the lips and teeth of excavating equipment involves much the same problem, but the method of application varies according to the type of material being excavated. If the equipment is to work in compact abrasive material, the hard-facing may be applied in a manner to assist in the work by keeping these wearing parts sharp until they become so badly worn that their replacement becomes necessary. These parts may be made self-sharpening by applying the hard-facing on the front or inside. This operation allows the base metal on the back side of these parts to wear away faster than the front, always keeping sharp the parts so treated. If the hard-facing should be applied in a reverse manner the edge would quickly become so blunt as to be useless after only a short working period.

If the equipment is to work in loose abrasive material such as sand and gravel, hard-facing should be applied on both the front and back sides as well as along the cutting edge. This will make the part more or less blunt, but highly abrasion resistant.

## Repairing dredge spuds

One of the most unusual welding jobs performed at Fort Peck was the successful repairing of four broken spuds. The spuds when in use are suspended vertically from the rear of a dredge in such a manner that they may be lowered or raised vertically by the operator. When digging, one spud is lowered and the point becomes embedded in the mud and sand of the river bed, securely

PUMP IMPELLER on jig in position for welding. The workmen can easily reach its top and deposit the metal in a flat position. Another impeller is shown on the lathe in the background.



anchoring the dredge but still permitting it to pivot about the spud. During the dredging season four spuds were broken and unless they could be repaired immediately there was a possibility of a costly shutdown should another spud be broken, as there were no replacements on hand. Also, if a successful repair could be accomplished, several thousands of dollars of replacement expenditure could be saved.

The spuds are made of cast steel in the form of a long hollow cylinder, pointed at one end. They are 75 ft. long, 32 in. in diameter and weigh 27 tons. The wall thickness varies from 1½ in. at the pointed end to 3 in. at the top. Because of their unusual size and shape and the fact that they must be within ¼-in. of plumb, a nearly impossible tolerance when welding a cast steel object of this kind, a most difficult task was at hand.

To effect these repairs it was first necessary to bevel the fractured edges of the spud just as though they were pipe ends to be joined by butt welding. The broken sections were then placed on skids, the skids being of sufficient length to permit the rotation of the spud during the repairing operations. After being accurately aligned the ends were clamped into position by means of four sets of bolts and angle clips and then tack welded. By using the electric arc process and two workmen—one welding opposite the other—the heat expansion was nearly balanced, thus avoiding a crooked spud.

After the weld bead had been completed the repair was reinforced by welding eight 1x5x30-in. steel plates across the joint on the inside of the spud. Through this simple procedure, requiring 175 lb. of electrode, a hard job became an easy one, and the repairs were successfully completed.

### Pipeline maintenance

The maintaining of the 70,000 ft. of 28-in. pipeline used in carrying the dredged material to the fill area is another of the big and continuous welding jobs. However, with the exception of making the special fittings, the welding differs very little from routine shop work.

Frequently the shop is also called upon to make special fittings for the pipeline such as wyes, elbows, reducers and gate valves.

### Duplicating castings

While the work described above represents a major portion of the welding shop operations, other work is being done. Frequently the shop is called upon to duplicate a complicated casting or part using only the structural shapes and plates that are obtainable from the shop steel yard. Usually these pieces are fabricated immediately, thereby eliminating the necessity of ordering a renewal part, and also saving days of delay that would be caused by awaiting the delivery of some such part from a far away factory. The other welding activities include the cutting and rebuilding of rails and switch points, rebuilding of locomotive tires for the railroad, reclaiming gears, sprockets, track plates for tractors and draglines, or the welding of a cylinder head or block on one of the many trucks and cars used about the project. The welding equipment also includes two truck-mounted electric welding machines that may be used on field jobs. In the carrying out of these activities the shops are using over 20,000 lb. of general-purpose welding rods and about 5,000 lb. of hard-facing electrodes a month.

During the 1935 dredging season 20,898,700 cu.yd. of fill were placed in the dam, which represents an average of 108,800 cu.yd. per working day. Without the assistance of modern welding methods this remarkable record probably could not have been attained.

D. B. Botkin is head of the plant section of the Fort Peck District, with the writer in direct charge of the shops.

# Controlling Flashboard Drop By Collapsing Pipe Supports

**Tests made in the National Hydraulic Laboratory show that the use of pipe supports for flashboards makes possible a close determination of the point of collapse**

By Clifford A. Betts
*Engineer on Dams, Region 7, U. S. Forest Service, Washington, D. C.*

RESERVOIR level regulation between comparatively narrow limits can be facilitated by raising the height of a dam with flashboards that will collapse under a predetermined head of water and thus by-pass the excess flood waters. The additional storage capacity conserved by the flashboards during normal dry periods is of considerable economic value, particularly in power, water supply and recreational developments. Where the cost of obtaining adequate spillway capacity for an earth dam by means of a simple overfall spillway is found to be prohibitive, the use of automatic flashboards permits provision for handling the rare floods which otherwise might prove disastrous.

Such use of flashboards presupposes failure of the supports within comparatively narrow limits, such as a few inches rise in pond level. Assurance that the boards will fall is essential to the plan. To establish the tolerances and determine the limits within which collapse will occur was the object of recent tests of full-size flashboards made at the National Hydraulic Laboratory of the National Bureau of Standards in cooperation with the U. S. Forest Service of the U. S. Department of Agriculture.

These investigations were confined to standard galvanized steel and wrought iron pipe, solid steel pins having been previously tested and found more difficult to control for the smaller installations because of variation in carbon content of the steel and other obvious characteristics.

A concrete dam 20 in. high and 25 ft. long was constructed in the large flume of the laboratory. Pipe sockets of 4-in. inside diameter by 20 in. long were embedded in the crest of the dam to hold the pipe pins of various sizes. Bearing in the socket was provided by nesting pipe; 3½ and 3 in. sleeves being used to take 2½-in. pipe pins, for example.

Pipes were spaced 5 ft. apart at first, thus giving five separate panels of flashboards, each 5 ft. long. Afterwards, one flashboard gate 16 ft. long and of various heights was supported by two pipe pins symmetrically located with respect to the center of the spillway, the ends of which were flat surfaces normal to the axis of the dam so that there would be no leakage of water around the end of the flashboard during its fall. The ends of the flashboards were provided with rubber seals.

The height of the 2½-in. thick flashboards ranged from 1 ft. 10 in. to 5 ft. 2 in., depending somewhat on the water level obtainable with the available quantity of water. The head of water behind or above flashboards, as the case might be, was furnished by pumps or by release from the storage tank, or both. Pump capacity was limited to a total of 30 sec.-ft.

Overflow and non-overflow conditions were tested and moment formulas for determining the sizes of pipe required for each type of flow were derived.

For overflow conditions, the moment $M$ in inch-pounds equals $375\ B^2L\left(H+\frac{B}{3}\right)$; for non-overflow conditions, $M = 125h^3L$; where $B$ equals the height of flashboards above the spillway, $H$ equals the height of water above the flashboards at failure, $h$ equals the height of water above the spillway and

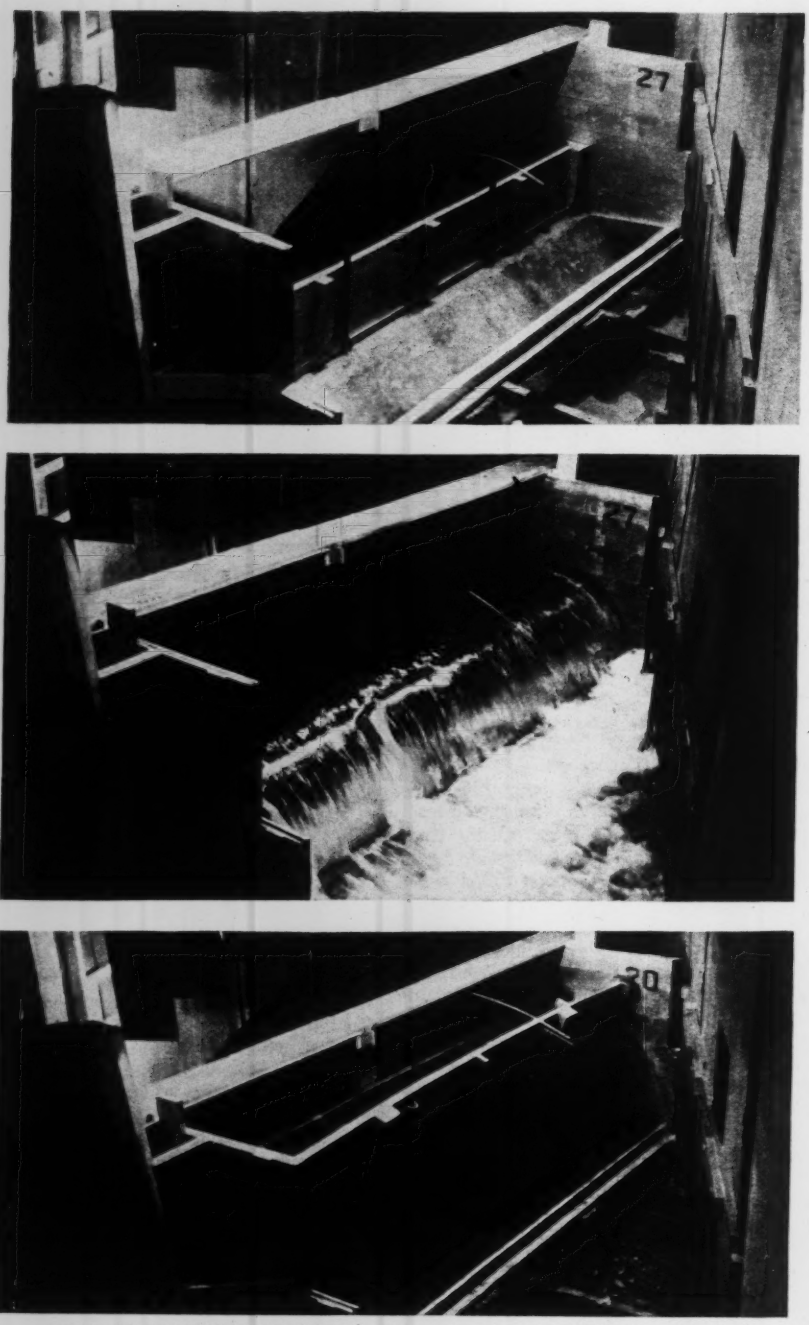



FIG. 1—THE FLASHBOARD SET-UP for the overflow test using 1½ in. diam. pipe is shown in the upper photograph; below is shown the same test after the failure of the pipes and at the bottom is a non-overflow test just before failure.

$L$ equals the span supported by one pipe, all in feet.

Dividing the moment $M$ by the ultimate strength $f$ (sometimes called modulus of rupture) for steel pipe, as determined by the tests (see table), gives the section modulus $S$ of the pipe required to support the boards under the prescribed water head. For convenience, the section moduli of pipe commonly used are listed in the table. For other sizes of pipe, the moduli can be obtained by using catalog dimensions or by actually measuring the inside and outside diameters of the pipe, but this latter refinement affects the result less than 4 per cent. The use of an average value of 75,000 lb. per sq.in. for the breaking strength was found to give reasonably close control. The actual values obtained in the tests ranged from 67,000 to 81,000 lb. per sq.in.

DESIGN DATA FOR STANDARD GALVANIZED STEEL PIPE

| Nominal Inside Diameter of Pipe ($d$) (Inches) | Section Modulus ($S$) Inches³ | Ultimate Strength ($f$) (Lbs. per Sq.In. Empirical |
|---|---|---|
| ¾ | .070 | 80,000 |
| 1 | .135 | 77,000 |
| 1¼ | .235 | 73,000 |
| 1½ | .330 | 72,000 |
| 2 | .560 | 70,000 |
| 2½ | 1.070 | " |
| 3 | 1.750 | " |
| 3½ | 2.400 | " |
| 4 | 3.250 | " |
| 5 | 5.450 | " |

The deflections of the pipe during the progress of failure were recorded by taking transit readings on a scale attached to the pipe. Separate studies are being made of these observations in connection with mechanical tests on the pipe. As a rule, the pipe yielded rapidly after passing an angle of from 20 to 30 deg. with the vertical. Up to the yield point, bending was gradual and uniform. There is some recovery in the pipe due to elasticity when water level

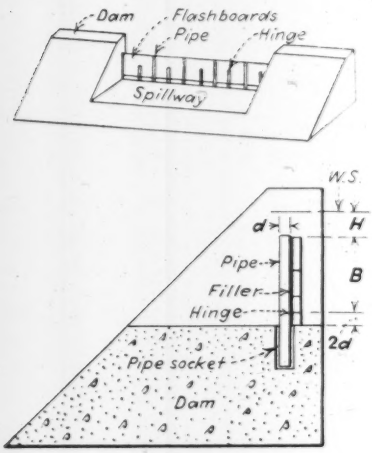



FIG. 2—THE METHOD of setting flashboards in the laboratory tests is here shown diagrammatically.

was reduced during the early stages of bending, particularly where the deflection was less than 10 deg. Standard pipe possesses the favorable characteristic of failing completely at a smaller deflection angle than either extra heavy pipe or solid steel pins.

As a result of the tests, installations have been made with flashboard gates hinged at the base so that after by-passing a flood they can be re-erected readily and new pipe installed.

During the recent high water a hinged gate at Sherando Dam, Virginia, 35 ft. long by 3½ ft. high worked very much as did the tests, gently falling in its own surge when the water reached an elevation within 1½ in. of the height indicated by the derived formulas.

A considerable number of installations will be needed by the Forest Service this season, to replace stop logs which gave difficulty at flood stages.

T. W. Norcross is chief engineer of the U. S. Forest Service and J. C. Dort, assitant regional forester, is in charge of engineering in Region 7 (Eastern Region). The National Hydraulic Laboratory where the tests were made is under the direction of Mr. Herbert N. Eaton and the investigations were conducted by Chilton A. Wright.

# Compiling Engineering Records For a Small City

**By systematic endeavor during a respite from construction activities, maps were brought up to date, bridges inspected, benchmarks checked, boundaries monumented and all records indexed**

By J. L. Parsons
*City Engineer, Fort Dodge, Iowa*

FOR 70 YEARS prior to April 1935 little had been done in Fort Dodge, Ia., to systematize the records in the office of the city engineer. Considerable data had been preserved in note books, plats and profiles, but due to the lack of an adequate indexing system it was difficult to locate desired information. During the past season there has been little construction work to plan and supervise owing to the general dearth of funds, so considerable time has been available for compiling and indexing pertinent data. A recital of how these records were put in usable form in a comparatively small midwest city where the staff consists of the city engineer and one or two draftsmen follows:

Since all city and many private activities require an accurate set of subdivision plats the first project was the preparation of a complete set of such plats. A standard size of tracing, 22x28 in., was decided upon and one or more additions drawn on each sheet. Thirty-one sheets were required, plus an index sheet. The prints were bound in an attractive folder by a local printing office. In making these plats free use was made of all the original records in the county auditor's and county recorder's offices and a large amount of assistance was rendered by the assessor's staff and a local abstract office. Upon completion a full set was filed in the offices of the city clerk, mayor, superintendent of sewers and water department, building inspector, assessor and in the local abstract office.

### Bridge and viaduct inspection

Next in order was a complete inspection of all the viaducts and bridges in the city and an office record of each structure by number together with a record of the date of inspection and a tabulation of necessary repairs. Previous experience as county engineer indicated that immediate attention to minor repairs usually saves large expenditures later. The necessary repairs were referred to the proper city department and were all promptly made. In the future it is planned to make an annual inspection and to keep the record and repairs up to date.

Another important compilation of data resulted from a study of the city bench mark system. All known and checked elevation marks were spotted on a city plat and indexed by number. Since completion of this work all new surveys have been tied-in to these bench marks and additional elevation points are being established and recorded as occasoin requires.

### Surveying and monumenting

Numerous problems in connection with boundary lines have arisen through the absence of survey control points, particularly on block and lot corners. This deficiency caused much trouble in the location of street lines, building lines, property divisions, and sidewalk lines; few permanent corners were recorded and many of these lacked agreement. In this city it has been customary for the city engineer to make all lot surveys requested. Because of the apparently hopeless confusion encounteded in this work all available time not otherwise employed has been used to complete a re-survey of the entire town. In this project field measurements were taken of the boundaries of all subdivisions and notes made of existing corners and property divisions, such as fences, stakes, hedges, walks and street lines. After this work was completed on one side of every street and avenue office studies were made to determine the proper location of the block corners to be established. Many inconsistencies were found but every effort was made to establish corners which would not disturb existing property lines more than necessary and to adhere as closely as possible to proportionate measurements.

Approximately 58 miles of measurements were made and corners were monumented with iron stakes; more than 150 old corners were located and checked. Particular care was taken to tie-in carefully all monuments with nearby permanent structures. In the office this data was recorded in note books and indexed. A separate index card was assigned to each block and on the face of this card the subdivision and block number were given and reference made to the proper note book. The back of the card carries a small scale drawing of the block showing important features and measurements.

This method of recording has proven to be of considerable value in the establishment of boundaries. Additional references will be added to these cards and in time it is hoped to complete a record of all corners and measurements for every block in the city. For convenience in reference every corner established thus is spotted on the proper subdivision plat.

The key city map has not been corrected or brought up to date since 1926 and in numerous instances the subdivisions were not properly correlated. Steps have been taken to correct this deficiency by developing an entirely new map. This undertaking will require considerable time. It is intended first to complete the city map without showing improvements and to follow this with supplementary maps showing separately such work as storm and sanitary sewers, water mains, school and voting districts and street paving. It is expected that some of these maps will be printed in colors, separating the different subdivisions for convenience in use.

As a corollary to other activities an attempt was made to index by subdivisions the information contained in note books, plats and profiles. All drawings and note books were given file numbers. Differently colored cards were used to index information relating to sanitary and storm sewers, corner location data, subdivision plats, etc. As a result it is now possible to locate any information in this office at a moment's notice.

## Reclamation Bureau Reports On All-American Canal

Approximately half the excavation required by the All-American Canal has been completed, John C. Page, Acting Commissioner of Reclamation, reported on March 19. A total of 30,503,947 cu.yd. of material has been excavated to date in construction of the irrigation ditch. The first shovel of earth was moved Dec. 16, 1934, and on March 1 a total of 1,312 men were at work.

The All-American Canal will serve the rich Imperial Valley of California, replacing the present main canal which crosses from the Colorado River to the irrigated section of the valley through Mexico for more than 50 miles.

It will have an initial capacity of 15,000 sec.-ft., and a capacity of 10,000 sec.-ft. for most of its length while crossing the desert. It will be 80 miles in length, and is designed to carry water to irrigators now farming 500,000 acres of reclaimed land.

Work is now under way on all the major features of the canal, except a siphon near Calexico, Calif., to carry the stream across the gorge of New River. Designs for this structure are now being prepared at the Denver engineering office of the Bureau of Reclamation.

# Navigation Dams Near Pittsburgh Damaged By Floods

DAMAGE OF UNUSUAL character was caused by the floods of March 17-19 at two navigation dams on the Ohio and Allegheny Rivers near Pittsburgh. At Braeburn, Pa., the Allegheny River cut around the left abutment of Dam. No. 4, breaching a gap about 175 ft. wide and 2,000 ft. long, carrying away buildings, railroad tracks, a siding and turntables, and threatening the main line tracks of the Conemaugh Division of the Pennsylvania R.R. At Neville Island immediately below Pittsburgh where the old Emesworth Dam was being raised under contract, the Ohio River flood waters wrecked two 110-ton lock gates, tore out the lock esplanade, toppled the contractor's large whirley crane and a gantry crane into the cofferdam, and cut a big slice out of the island below the dam.

### Long, hard fight at Braeburn

The Allegheny River went out of its banks at Braeburn on the night of March 17, and it took just 3 weeks of work carried on 24 hours a day to close the gap between the abutment and shoreline with a stone dike. As the flood waters rose an army of workmen supplied by the Pittsburgh U. S. Engineer Office and the Pennsylvania R.R. waged for many days and nights what appeared to be a losing fight against encroachment of the river in the new channel. Thousands of sand bags and many carloads of stone dumped over the bank were swept away as the stream cut farther inshore, finally toppling into the stream a brick office building, the siding and turntable, yard tracks and a street. Cutting of the shoreline was finally checked by revetting with stone blocks, weighing from 5 to 20 tons each. Closure of the gap was made by dropping 15-ton blocks of stone from a derrick boat.

Between the main line railroad tracks and the river, immediately above the dam, is the plant of the Braeburn Steel Co. When the dam was completed several years ago an earth dike was built to protect the plant, the dike tying into the railroad embankment above the plant. Observers report that the flood first broke through the dike and railroad at the point of juncture. Eventually the dike was overtopped by 5 ft., and the steel plant suffered severe damage from the violence of the waters. One mill building collapsed and a new brick transformer house and its equipment were wrecked. The company's two-story brick office building, near the river bank, took a terrific battering from the flood, and later collapsed and disappeared into the stream in sections as its site was completely washed away. The roundhouse and railroad yards were located just below the dam between the river and mainline tracks.

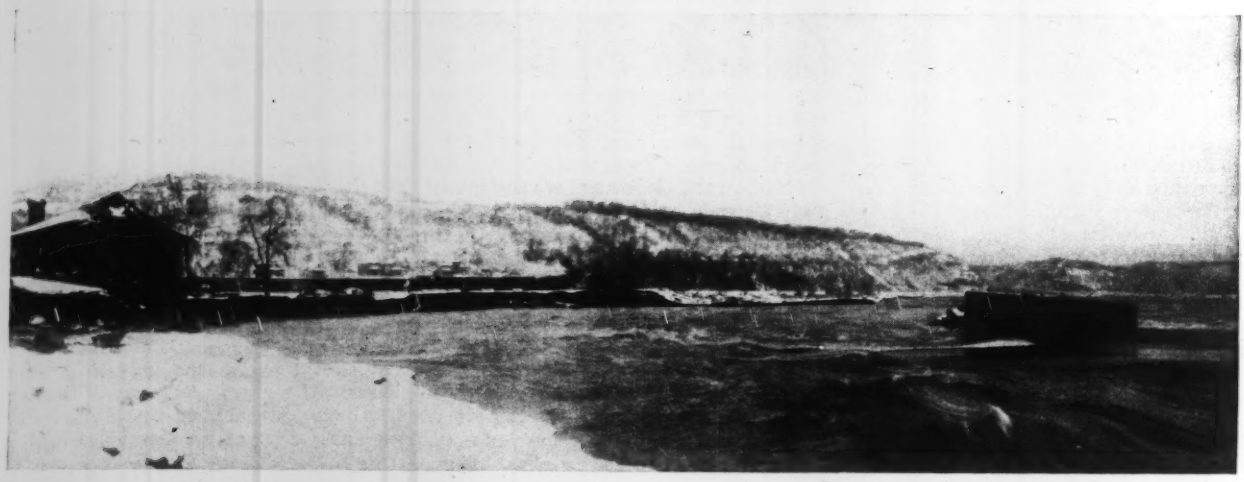
It was not until the waters had receded below bank level that the breach behind the abutment was discovered. The abutment is at the left end of the full overflow concrete dam at the opposite side of the river from the lock. The original shoreline was broken for a distance of 200 ft. upstream from the abutment and water swept through this opening in a long sweeping curve, returning to the original channel some 2,000 ft. downstream.

Major W. D. Styer, U. S. District Engineer, was on the job early and personally directed operations. With a view to ultimately closing the gap with a dike along the line of the original river bank, he concentrated every effort to stabilize the point where the break met the shoreline, and thus keep to a minimum the length of future closure. Rock by the carload, handled by both land and floating equipment, was piled up at this point until no further washing was possible (Fig. 3). In the sweep around the bend, the current was too swift to permit the use of floating plant and the fight to stop bank erosion had to be carried on from the land side alone.

Several succeeding rises in the river, none of which overtopped the bank, hampered the work of stopping the shore erosion. When the undercutting of the bank was finally checked, efforts were directed to closing the gap. This also proved to be a hard fight. Trainloads of 15-ton stone blocks were brought in from quarries as far as 60 miles away. The blocks were transferred to a derrick boat floating on anchor lines above the break.

FIG. 2—Gondola car loaded with rock dumped over the bank to check erosion.

FIG. 1—ALLEGHENY RIVER cuts a new course around Braeburn Dam with disastrous results. This view is looking downstream across the break with the left abutment of the dam in the right foreground. Eventually the brick office building at the left fell into the stream which cut back as far as the boxcars beyond the present bank.



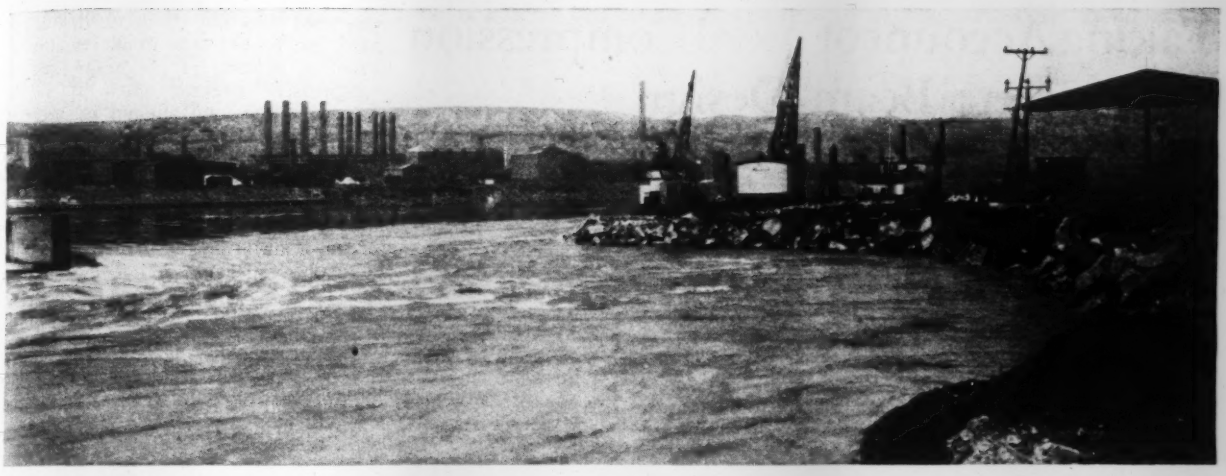


FIG. 3—POINT on the original shoreline at the upper end of the breach at Braeburn Dam that was protected from further washing by a fight with land and floating equipment. The dam abutment is at the extreme left. The brick building shown in Fig. 1 formerly stood in front of the large crane.

It is reported that at first the huge blocks were swept away as fast as they were placed. Several days and nights of continuous work were necessary to close the gap.

The dike is not watertight, but it has reduced the washed out section to slack water. Plans for complete repair have not as yet been completed. The dam and abutment, founded on rock, are apparently undamaged. An impervious fill will probably be placed behind the stone dike, but just how much of the washed out section will be backfilled has not as yet been decided.

### Damage at Emsworth

At the old Emsworth Dam, Seeds & Derham, of Philadelphia, were carrying out a contract for raising the structure. About half the length of the dam, next to the locks, was enclosed in a cofferdam of steel pile cellular construction on the upper side and ends of the old dam and a single wall of steel piling forming the cofferdam on the downstream side. The contractor had two large steam whirley cranes planted on the upstream arm, and a light gantry pile-driving crane spanning the cofferdam. The floods overtopped the cofferdam by several feet and dumped one whirley and the gantry into the hole as shown in Fig. 4 Early backwaters badly damaged the single-line downstream arm of the cofferdam.

The high cofferdam naturally diverted the bulk of the flood waters to either side with disastrous results. The waters tore the lower gates of the main locks from their position and completely wrecked each of the two 110-ton sections. One leaf was ripped off its hinges; the other hung to its hinges but was severely twisted and battered. The rush of water through the lock area gouged out much of the heavy concrete paving of the esplanade.

FIG. 4—AT EMSWORTH DAM receding waters left this wreckage; a large steam whirley crane and a gantry piledriver in the cofferdam (above), and a 110-ton lock gate (below); the remains of a companion gate protrude from the water at the upper left.

The concentration of water around the cofferdam on the opposite side of the river played havoc with the Neville Island shore below the dam. Here the river cut into the bank on a long sweeping curve for a maximum width of 250 ft. Fortunately the area was unoccupied except for two houses, one of which was lost. The work of backfilling the washed-out area is now in progress.

# Taking Account of Axial Compression In Concrete Beam Design

## Development of a design method for a condition which when ignored as is common practice results in a deficiency in reinforcement and an excessive beam depth

By Harry E. Eckles
*Assistant Highway Engineer*
*Illinois Division of Highways*
*Springfield, Ill.*

MANY REINFORCED CONCRETE structures are in part subject to combined stresses due to considerable axial compression in addition to the loads which produce bending stresses in the usual way. Among these are walls in buildings, breast walls of abutments, and rigid frame structures. The method of designing members in such cases has not been fully treated in standard works on reinforced concrete, so that the designer has been left to his own devices and been somewhat unclear in the matter. The usual formulas for the depth of the compression area in beams without axial loading are developed on the assumption that all compression in the concrete is induced by the tensile reinforcement. It is shown here that these formulas cannot be used where this compression is due in part to an axial load. In the latter case the value of $k$ is substantially larger, and is not dependent alone on the specified value of $f_c$, $f_s$ and $n$, as in the ordinary case, but depends also on the axial load and area of the cross-section of the beam.

In developing the formulas presented herein the usual nomenclature is used, except as noted. It is axiomatic that the total compressive stress at every cross-section under flexure is on the compression side of the beam, and is: $A_s f_s +$ W, where W is the axial load in pounds and $A_s f_s$ is equal to the compression produced by the tensile reinforcement. It follows from this that where compression reinforcement is not used:

$$A_s f_s + W = 0.5bdk_1 f_c \qquad (1)$$

Here $dk_1$ is the distance from the neutral axis to the compression face of the beam. From Eq. (1):

$$bdf_s p = 0.5bdf_c k_1 - W \qquad (2)$$

The ordinary equations which give the values of $f_s$ and $p$ do not contain $b$ and $d$, but only $f_c$, $f_s$, $k$ and $n$. If it were true that $k_1$ is determined in the same way as $k$ then the values of $f_s$ and $p$ could be substituted in Eq. (2) from the standard equations:

$$f_s = nf_c\left(\frac{1-k_1}{k_1}\right) \qquad (3)$$

$$\text{and } p = \frac{k_1^2}{2n(1-k_1)} \qquad (4)$$

Eq. (2) would then become:

$$0.5bdf_c k_1 = 0.5bdf_c k_1 - W \qquad (5)$$

Since Eq. (5) can be true only when $W$ is zero, it follows that Eqs. (3) and (4) are not applicable to the case of any reinforced concrete beam with axial loading. Eqs. (3) and (4) are fundamental equations derived from purely mathematical considerations and by the same reasoning. It is therefore apparent that $k_1$ cannot be determined alone from any assumed combination of $f_c$, $f_s$ and $n$.

Eq. (2) and Eq. (3) are based on the assumption that every cross-section of a reinforced concrete beam remains a plane during flexure. It is this assumption which renders them inapplicable to the case of a beam with axial loading, for it is apparent that the remainder of the process of their derivation is one of simple mathematical proportioning. In a beam with axial compression the tendency of any cross-section to remain a plane during flexure is true only in so far as the effect of the tensile reinforcement is concerned. The final effect is modified by the effect of the axial load, which produces an angle in every cross-section at the neutral axis. This is only another way of saying that the axial load produces additional compressive stress on the compression side of the beam, and must therefore produce a change in the direction of the plane at the neutral axis. It does not produce a change in the unit stress in the reinforcement.

This is illustrated by the accompanying sketch, which represents two adjacent segments of a concrete beam with no reinforcement, and subject to a load $P$ and an axial load $W$ applied at the center of the ends. The load $P$ causes bending in the beam which is resisted by the compression in the concrete at $oc$, the total amount of which is $W$. Since the concrete is not considered as having tensile resistance it is apparent that angles $aoc$ and $a'oc$ will be produced at $o$ when tensile strain is produced between $a$ and $a'$. These angles are due to the absence of a tensile force between $a$ and $a'$ which would keep these points in line with $o$ and $c$, as in an ordinary reinforced concrete beam.

It was previously assumed that $o$ was at the final position of the neutral axis when the beam is reinforced and that $k_1$ is equal to $oc$. The action of tensile reinforcement in a beam loaded as previously described does not eliminate the angles at $o$, but results only in increasing the resisting moment of the beam and the compressive stresses when $P$ is increased. The total amount of increase in the compression in the concrete is the same as the total tension in the reinforcement, a conclusion which satisfies Eq. (1).

The presence of angles at the neutral axis does not mean that the tension side of the beam is longer than for the case with no axial load. What does happen is that the total length of the compression side of the beam is reduced abnormally because the compressive stresses are made abnormally high throughout the length of the end segments of the beam by the axial load and because the load is resisted by the compression side of the beam.

As previously shown, the total compressive stress is made up of two parts, and for the purpose of developing the formulas for $d$ and $k_1$ they will first be considered separately, and the results afterwards combined. With $W = 0.5bdf'_c k_1$, the compressive stress due to the action of tensile reinforcement is $f_c - f'_c$. Also

$$f_c - f'_c = f_c - \frac{2w}{bdk_1} \qquad (6)$$

If $s$ is the strain on the tension side of the beam corresponding to the stress due to the axial load, $W$, on the compression side then:

$$\frac{s}{E_s} = \frac{2W}{bdk_1}\left(\frac{1-k_1}{k_1}\right)2 \qquad (7)$$

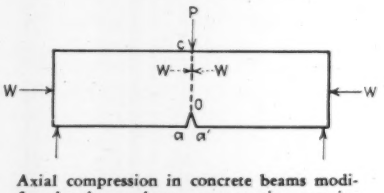
If $s'$ is the strain on the tension side of the beam corresponding to the reminder of the stress on the compression side then:

$$\frac{s'}{E_s} = \left(f_c - \frac{2W}{bdk_1}\right)\left(\frac{1-k_1}{k_1}\right) \qquad (8)$$

Combining equations (7) and (8) gives:

$$\frac{s+s'}{E_s} = \left(f_c + \frac{2W}{bdk_1}\right)\left(\frac{1-k_1}{k_1}\right) = \frac{f_s}{n} \qquad (9)$$

If $W$ is made zero in the last equation it will then become the well-known equation for beams without axial loading.




**Axial compression in concrete beams modifies the theory that a cross section remains plane under flexure. Actually a bend occurs at the neutral axis.**

The second coefficient of 2 in Eq. (7) is due to the angles in $aoc$ and $a'oc$ which are necessary in order that there may be more compression on the compression side of the beam than that which is induced there by the reinforcement. If

this coefficient had been unity Eq. (9) would then be lacking the term containing $W$. This would indicate that the axial load was without effect in determining $k_1$ and that no angle occurs in the cross-section at the neutral axis. Since the latter is the case when all of the compression is induced by the tensile reinforcement, such results would be contrary to the fundamental conception that the axial load is resisted by the compression side of the beam.

The derivation of the second coefficient of 2 in Eq. (7) can be better understood by considering the two segments of the beam illustrated as alternately having infinite rigidity while the opposite segment is subject to a compresson at $c$ of $2W \div bdk_1$. Each side produces one half the strain $aa'$. This consideration is necessary to make the whole demonstration presented herein consistent.

Proof of the correctness of Eq. (8) can be shown by making $s'$ zero and $k_1$ unity. It then reduces to $f_c = 2W \div bd$, which is the well-known equation for the maximum compressive stress in a beam of rectangular cross-section subject to axial compression and to bending just sufficient to reduce the stress to zero at the opposite side of the cross-section from $f_c$. For the latter conditions $k_1$ is unity and $f_s$ is zero for the type of beam under consideration. This is more readily apparent if the beam is considered to be loaded axially first and then subjected to sufficient bending to make $f_s$ zero. Then additional bending would cause $k_1$ to become less than unity and to decrease until $f_c$ has become a maximum. While this action is taking place the angles at $o$ are changing simultaneously with the movement of the point $o$ from the tension side to its final position. During the period of increase of bending after $f_s$ is zero, the axial load almost entirely determines the value of $k_1$ when $f_s$ is small. This shows the necessity for a term containing the axial load in Eq. (9) for determining the working value of $k_1$. (This same reasoning applies to beams similarly loaded and of homogeneous material capable of tensile resistance and to all beams with axial tension.)

For practical use it is desirable to transform Eq. (9), since the value of $k_1$ depends on more factors than can be assumed independently. By reduction and without substitutions it becomes:

$$\left[\frac{\frac{f_s}{n}+f_c}{f_c}\right]k^2_1-\left(1-\frac{2W}{bdf_c}\right)k_1=\frac{2W}{bdf_c} \qquad (10)$$

Here the coefficient of $k^2_1$ happens to be the equivalent of the reciprocal of the ordinary $k$. By the substitution of $k$ and reducing, Eq. (10) becomes:

$$k^2_1-k_1\left(k-\frac{2kW}{bdf_c}\right)=\frac{2kW}{bdf_c} \qquad (11)$$

The equation for determining $d$ will be developed from consideration of resisting moments. The total resisting moment, $M$, in in.-lb. about the middle of $d$, is:

$$M = A_sf_sd\,(1-0.33k_1)+Wd\,(.5-0.33k_1) \qquad (12)$$

Resisting moments are here taken about the middle of $d$ because this is usually the axis about which moments of the external loads have been taken. Substituting in Eq. (12) the value of $A_sf_s$ from Eq. (1) and reducing gives:

$$d^2-d\left(\frac{W}{\frac{1}{2}f_cj_1k_1}\right)=\frac{2M}{bf_cj_1k_1} \qquad (13)$$

For use in this equation values of $j_1$ and $k_1$ are found by Eq. (11).

In determining the required amount of tensile reinforcement, the total moment, $M$, must be reduced by the amount of the resisting moment due to the axial load acting on the compression side of the beam. This gives the equation:

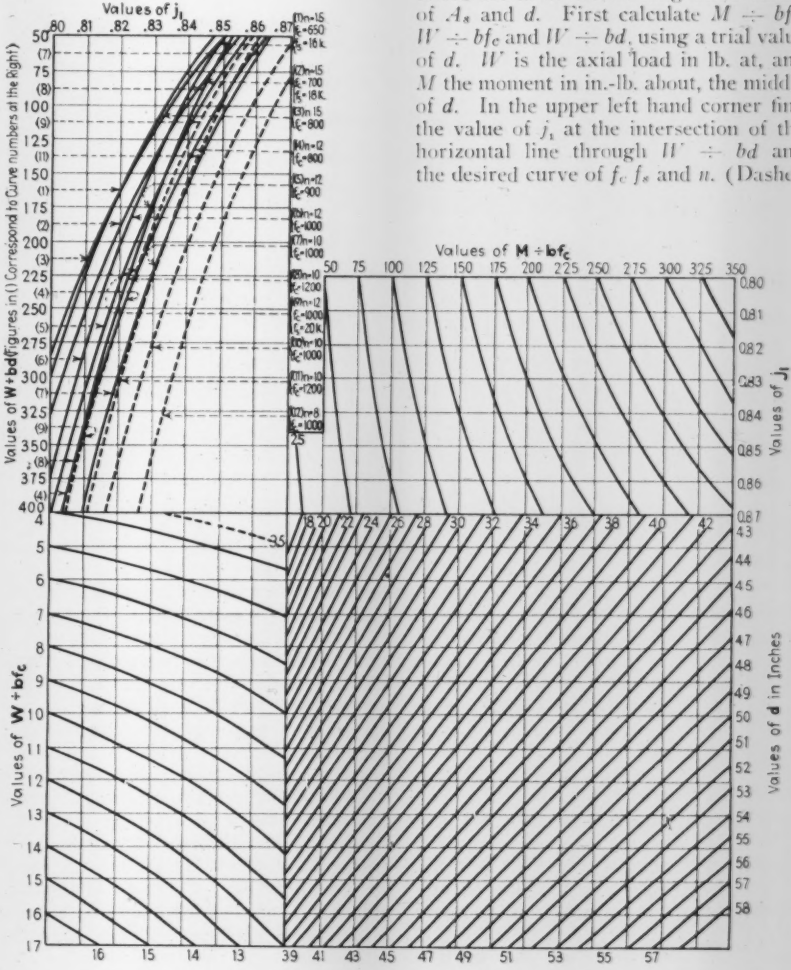
$$A_s=\frac{M-Wd\,(j_1-0.5)}{d\,f_s\,j_1} \qquad (14)$$

## Using the method in design

To illustrate the method of design presented herein assume data as follows: $f_c = 650$, $f_s = 16{,}000$, $n = 15$, $W = 30{,}000$ and the moment about the tensile reinforcement of a beam of 27 in. effective depth = 990,000 in.-lb. Reducing the moment to the middle of this depth gives $M = 58{,}500$. Using values of $b = 14$, $d = 22$ and $k = 0.3786$ in Eq. (11) gives $k_1 = 0.495$, from which $j_1 = 0.835$. Using the necessary data in Eq. (13) gives $d = 22.1$ and by Eq. (14) $A = 1.23$ sq.-in.

For $d = 27$, the required value of $b$ is only 10, and $A = 0.882$, by the method presented herein. By the conventional method the results are: $b = 14$, $d = 27$ and $A_s = 0.75$ sq.in. The latter results show an excess of 40 per cent of concrete and a deficiency of 15 per cent of tensile reinforcement for the same depth of beam by both methods. The deficiency in reinforcement is due to the common method of giving a value to $jd$ in excess of the actual value, while the excessive value of $b$ is due to giving a value to $kd$ less than the actual value.

The accompanying design chart will be found useful in determining these values of $A_s$ and $d$. First calculate $M \div bf_c$, $W \div bf_c$ and $W \div bd$, using a trial value of $d$. $W$ is the axial load in lb. at, and $M$ the moment in in.-lb. about, the middle of $d$. In the upper left hand corner find the value of $j_1$ at the intersection of the horizontal line through $W \div bd$ and the desired curve of $f_c$ $f_s$ and $n$. (Dashed




**Design chart for reinforced concrete beams subjected to combined bending and axial compressive stresses.**

line curves there are for $f_s = 20{,}000$, and the others for $f_s = 18{,}000$ except one for $f_s = 16{,}000$ as noted). Next find the intersection of the vertical line through $j_1$ with the curve below for $W \div bf_c$. Horizontally from there find $d$ at a vertical line intersecting the curve above for $M \div bf_c$. The correct vertical line is that which passes through the intersection of this curve with a horizontal line through that value of $j_1$ at the right which was found at the beginning. If necessary, repeat the operation with a corrected value of $W \div bd$, using for it the value of $d$ just found. For $A_s$ use $d$ and $j_1$ as thus found in: $[(M \div d) - W(j_1 - 0.5)] \div f_s j_1 = A_s$, which, it will be noted, is Eq. (14) above.

# Toledo Repairs Its Bridges

**Investigation prompted by Fassett St. Bridge collapse reveals other dangerous structures and the need for a $321,000 repair program**

THE COLLAPSE on Sept. 30, 1935, of two spans of the old Fassett St. Bridge in Toledo, resulting from an undermining of one of the piers, caused the city authorities to call in expert bridge consultants to make an investigation of the wrecked structure and later prompted them to have the study broadened to cover nine of the city's other bridges. The resulting report pictures a serious situation which the authorities of other cities may find enlightening in connection with their own bridges. In this abstract, in addition to information on the Fassett St. Bridge, a good many of the defects found on the other bridges are presented, not because they have individual significance for the reader outside Toledo but because collectively they emphasize the toll that age and inadequate maintenance are continuously exacting.

Briefly, in Toledo, emergency action had to be taken on five of the nine bridges investigated, in addition to the Fassett St. Bridge. The cost of urgent repairs and maintenance on all nine was found to exceed $140,000, as listed in the accompanying table. The Erie St. Bridge was immediately closed to traffic because of a dangerously weak timber deck. The Haverhill Drive Bridge was closed and a new deck installed. Operation of the movable span of the Summit St. Bridge was prohibited until a serious crack in one of the concrete pedestals under the bascule could be repaired. A 10-ton load restriction was placed on the St. Clair St. Bridge; and immediate backfilling of a badly scoured pier on the Ash-Consaul Bridge was begun.

In the table the item for the Anthony Wayne suspension bridge is almost entirely for painting maintenance; for the Cherry St., Fassett St., Ash-Consaul, Erie St., Summit St. and St. Clair St. bridges a considerable amount of engineering work is necessary in the planning of the repairs. A few of the worst conditions and some of the recommendations with respect to these bridges are outlined below.

RECOMMENDED EXPENDITURES ON TOLEDO BRIDGES

| Bridge | Type | Built In | Repair and Maintenance Cost | Life After Repairs, Years |
|---|---|---|---|---|
| Ash-Consaul | Thr. trusses, concr. appr. | 1915 | $52,000 | 10 |
| Cherry St. | 200-ft., double-leaf basc. conc. arch spans | 1914 | 21,000 | Indef. |
| Anthony Wayne | 785-ft. susp. | 1931 | 17,000 | Indef. |
| Haverhill Drive | 96-ft. thr. truss | 1890 | 2,400 | 3 |
| La Grange St. | 96-ft. thr. truss | 1890 | 1,500 | 2 |
| Champion St. | Timber trestle | 1915 | 500 | 1 |
| Erie St. | 126-ft. swing span | 1889 | 10,700 | 3 |
| Summit St. | 90-ft. double basc. | 1921 | 22,000 | Indef. |
| St. Clair St. | 125-ft. swing span | 1895 | 17,500 | Indef. |
| Urgent Maintenance and Repairs to Nine Bridges | | | $144,100 | |
| Fassett St. | Deck and thr. trusses and swing span | 1895 | $177,000 | 5 |
| | Total Repair..... | | $321,100 | |

## Scoured foundations

On the Ash-Consaul Bridge, dredging in the river and possibly scouring during ice jams was found to have caused undermining of a half dozen of the piers. At one of the piers this undermining reached a depth of about 8 ft. under the concrete base, which is supported on oak piles; fortunately the piles project some 4 ft. into the base so that danger of the pier sliding off is minimized. This pier is now being backfilled. On the concrete trestles of this bridge considerable spalling on the under side of some of the stringers has been caused by the discharge of water from the deck. Sidewalk brackets are damaged from the same cause. Several concrete brackets carrying concrete stringers at expansion points have cracked loose, and have been replaced by steel brackets. Concrete in the column bases has also disintegrated enough to expose the reinforcement in some locations; some of the bases have holes in them about 6 in. deep. The few columns that were checked were found to be leaning as much as 1 to 2 in. at the top.

In a steel-girder span in this bridge the segmental rollers were found to be rusted so tightly that no movement could occur, and the concrete was badly shattered both around the shoes and at various places in the roadway slab. Several members in the truss spans showed damage by vehicle collision and some of them have been repaired. Lateral bracing members were found loose. A number of teeth in the rack of the swing span were broken.

## Corrosion on a bascule

On the Cherry St. Bridge, which is 1,173 ft. long and includes a 200-ft. double-leaf deck-girder bascule, minor repairs are required in the concrete approaches. All the stringers and laterals adjacent to the counterweights in both leaves were rusted badly. Only four of the eight live-load anchorage bearings are in contact. All rack supports were rusted a few inches above the top of the concrete. The supports for the outside racks were almost completely rusted through, so that they could take very little load and yielded noticeably under the application of load from the pinions; the load was therefore thrown mainly on the center racks, which were also damaged by rusting. Since it is possible that the full motor torque might be developed on these center racks, the condition was reported to be quite dangerous and under a high wind or sleet or snow load it was possible that the rack supports might fail and that the anchorages would be unable to prevent a leaf rolling into the river. The differential gears were in dangerous condition and might fail at any time. The hubs were so worn that the main gear rims wobbled badly out of line. The rusted rack supports and worn machinery parts were repaired promptly, thus eliminating the dangerous conditions which existed.

## Damage from vehicle collision

The condition of the Haverhill Drive Bridge is such as not to justify an expenditure necessary to restore the trusses to full efficiency, the report states, but a new deck should be constructed with curbs of sufficient height and width to provide reasonable protection to the trusses from damage by vehicles. This has been done and the bridge reopened to traffic. Plans for a new structure to replace this bridge have been drawn.

The conclusions with respect to the LaGrange St. Bridge are the same—namely, that extensive repairs are not justified by the return in service that is possible. However, badly damaged end posts should be straightened and reinforced and sidesway in the top chord reduced by welding on double-angle kneebraces. Bolts should be tightened and the stone masonry pointed up.

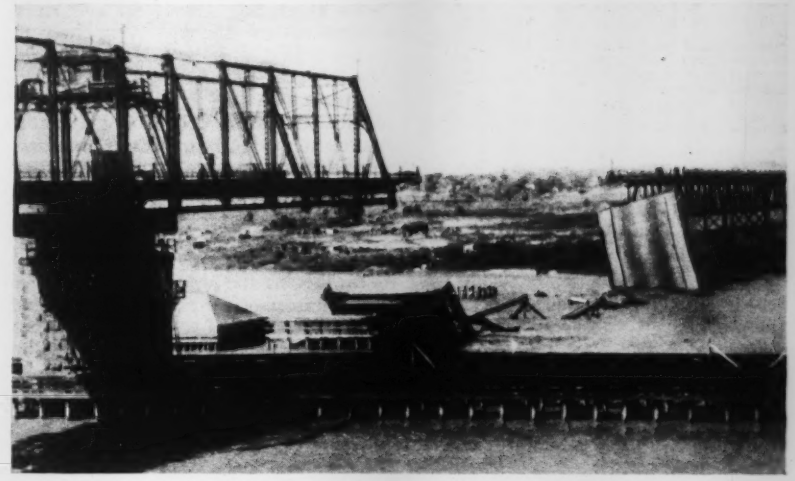
Since none of the timber in the Cham-

pion St. timber trestle bridge has been treated, this bridge has already had a life somewhat in excess of its normal expectancy, according to the report, and further repairs except of a very minor nature are not justified. Traffic should be limited to private cars and light delivery trucks. Since the report was written, a bad ice jam has carried out several bents in this bridge, putting it entirely out of service.

The Erie St. Bridge, a 126-ft. swing span is in generally poor condition, and the piles and grillages can be depended upon for the support of the masonry for a few years only, since the lowering of the lake level has exposed the grillages and the pile heads to the air. A new bridge is recommended for this point. Restoring the present bridge to service for 10-ton loads requires a new timber deck. Higher and wider curbs should be provided, to protect the trusses from vehicles, and new end floorbeams, a new pinion support, and new upper angles for the lower portal struts are necessary. The piles and grillages of the center pier and north abutment should be surrounded with sheetpiling and backfilled with clay, to retard the rapid rotting that is taking place. Until most of these repairs are made the span must remain closed to traffic.

### Lack of expansion facility

The Summit St. Bridge consists of a double leaf 90-ft. bascule with three 50-ft. concrete deck-girder approach spans at the north end. Investigation disclosed that under H-20 loading the roadway stringers are stressed to 17,600 lb. per sq.in. on gross section and 20,600 lb. per sq.in. on net section; the intermediate floorbeams are stressed to 18,600 lb. in compression and 20,400 lb. in tension. With proper maintenance these stresses may be considered safe according to the report, although they are higher than would be used in designing a new bridge. Serious rusting has occurred on several main girder flanges, the stringers and the lateral bracing. At some points the accumulation of rust holds moisture which accelerates the further deterioration of the steel. Concrete approach spans have been displaced 2½ in. south due to the active earth pressure on the north abutment wall combined with a progressive crawl resulting from successive expansions and contractions of the spans. The sliding expansion plates at one end of each girder appear to be rusted tightly together. The brick paving is laid without expansion joints. On the north bascule pair an inverted triangular pyramid of concrete under one of the bascule supports has been split away and has tipped forward about 1½ in. from the front face, this action occuring as a result of the southward shifting of the concrete girders. There is apparently a lack of reinforcement in the north abutment wall, which is too thin to act as a gravity wall; the wall is tipped forward and is rotating on its base. The report recommends that all of the damaged concrete in the pedestal on this north bascule pier should be replaced and the bolster and track girder raised to correct elevation before the bascule leaf is operated. The front wall of the north abutment should be tied back by rods anchored to concrete deadmen. The expansion joint of at least one girder span must be freed. A positive expansion joint in the paving and in the sidewalk slab must be provided at the same point. The repairs to the north bascule pier and to the north abutment wall have been authorized.



COLLAPSED SPANS of the Fassett St. Bridge at Toledo whose failure is attributed to undermining of a pier foundation.

### Dangerous counterweight supports

The rim-bearing 125-ft. swing span of the St. Clair St. Bridge requires replacement of some rusted stringers, and other over-stressed stringers, a new deck, and extensive repairs to the counterweight in addition to other minor changes. The transverse beams that support the counterweight and are below the floorbeams have rusted very badly.

Some new concrete blocks on the counterweights are supported by inclined oak planks resting on the bottom flanges of the girders and against the sidewalk stringers. These steel and timber supports are in such dangerous condition that some of them may fail at any time. Under such conditions, if about a third or more of the counterweights should fall off when the span is open, the span would tilt off the center pier. In view of this condition further operation of the span should be discontinued; in the closed position no serious damage would result from failure of the counterweight supports.

### Fassett St. Bridge failure

In an analysis of the collapse of two spans—a 250-ft. through truss and a 125-ft. deck truss—of the Fassett St. Bridge over the Maumee River, the report brings out the fact that the sandstone masonry pier on which these spans rested had been undermined by scour to a depth of 11 ft. below the timber grillage that capped its foundation of 52 elm piles. Failure of nearly all of these piles by breaking at the level of the hard clay bottom was revealed by a diver's examination, which explains the manner of failure. The cause of failure, according to the report, was a westward thrust at the top of this pier created by a 9-in. eastward inclination of the steel rocker bent that supported the through span on the pier, combined with a south wind of about 35 m.p.h. This thrust subjected the piles to a bending moment large enough to break them. The leaning of the rocker bent had been known since 1933. In that year, also, the city division of engineering had proposed backfilling the pier, but funds for the purpose were not made available. Had the pier not been undermined, the report states, the failure would not have occurred in spite of the horizontal thrust at the pier top.

Divers located the pier about 30 ft. west and 20 ft. north of its original location. It was in one piece and had evidently slid off the timber grillage as the latter tilted when the piles failed. The top six courses of masonry on the pier at the opposite end of the through truss, which were engaged by anchor-bolts, were pulled off and went down with the span. The deck truss remained connected to its end pier, rotating about the shoe pins, and came to rest at an angle of about 40 deg., as shown in the accompanying picture. This view also shows the swing span which adjoined the collapsed through truss; an emergency support in the form of a steel bent was placed under the end of this swing span.

The report recommends the reconstruction of this bridge for 10-ton loads

ESTIMATED COST
TO REPAIR FASSETT ST. BRIDGE

| | |
|---|---|
| Reconstruction of wrecked spans and piers | $77 000 |
| Work on existing portion of the bridge | 100,000 |
| Removal of old wreckage | 5,000 |
| Engineering and supervision | 15,000 |
| Total | $197,000 |
| Less work done under WPA or relief | 20,000 |
| Cost to city | $177,000 |

at a cost of $177,000, and gives it a life of five years after such repair. Since it would cost about $15,000 to remove the river spans and piers if the bridge is not reconstructed, the net cost of keeping the bridge in service for five years is $162,000. A new bridge of the same width (24-ft. roadway) would cost about $1,900,00. The present bridge includes, in addition to the two wrecked spans, some 1,700 ft. of steel trestle, a 301-ft. swing span, six 125-ft. deck truss spans and four through truss spans of 140 to 200 ft. The total length of the bridge is 3,696 ft.

It will be noted that $100,000 of the cost is for repair of the existing portions of the bridge. This work includes such items as placing gravel fill and riprap around two of the piers, covering the timber grillages of two other piers now exposed (due to lowering of lake level), repairing the tops of twelve sandstone piers with reinforced concrete, adding heavier timber curbs to protect the trusses from further damage by vehicles, shimming the blocking on the chords of the deck spans to provide a continuous support for the plank decking, replacing badly rusted stringers, straightening and strengthening the top chords of a number of 62-ft. trestle spans, replacing the rusted angles in the portal struts of the through spans, restoring enough expansion points to service to insure relief from distortion due to temperature, and providing a new bevel pinion and a modern brake on the swing span as well as realigning the end lift machinery, and thoroughly cleaning and painting the entire metalwork.

Particularly significant is the statement in the report that all of the roller nests are rusted tight and show no evidence of movement, except at one pier where they have been displaced and are nearly out from under the girders. In other places lack of expansion and contraction ability has caused bending in the truss members and shearing of stringer bolts.

To replace the wrecked spans, the report recommends a new pier about 40 ft. farther from shore, providing two spans of about 210 and 165 ft. respectively. The longer span would be a deck anchor span, and the shorter a cantilever with a suspended portion at its outer end. Such construction would place the greater part of the load on the new pier and reduce the loads on the existing piers.

The investigation was made by Waddell & Hardesty, consulting engineers, New York, at the instance of George N. Schoonmaker, director of public service of the city of Toledo. The field inspection was made under the direction of Shortridge Hardesty by Maurice N. Quade, who was assisted in the work by C. L. Piper, bridge engineer of the city of Toledo.

# World Power Conference Plans Taking Definite Form

**Third World Power Conference will discuss national power economy — Second Congress on Large Dams to meet with the conference in Washington—Several tours planned**

By Lieut. Col. Glen E. Edgerton
*Corps of Engineers, U. S. Army, Washington, D. C.*

THE THIRD WORLD Power Conference and the Second Congress of the Internation Commission on Large Dams will be held concurrently in Washington, D. C., on Sept. 7 to 12, 1936. International gatherings of this kind are the outstanding educational development in the scientific field in recent years. They offer engineers and others throughout the world opportunities for the exchange of ideas and information which were not available to earlier generations.

The permanent organization of the World Power Conference, effected in 1923, is in the form of a federation of national committees of the participating countries. Business is transacted through an International Executive Council, which consists of one representative from each country, and meets annually at the central office, located at present in London. The International Commission on Large Dams, organized independently in 1930, has become a part of the World Power Conference, and will hold a concurrent meeting as it did six years ago in Berlin.

Plenary world power conferences are held every six years. In the intervals between world conferences, sectional meetings are held for the consideration of specific problems. The First World Power Conference was held in London in 1924, and the second in Berlin in 1930. Sectional meetings have been held in Basle, London, Barcelona, Tokio, and Stockholm.

### Fifty nations to be represented

The President of the United States has extended to the countries of the world an invitation to participate in the Third World Power Conference. It promises to excel its predecessors in almost every feature. It will be the first such conference to be held in the Western Hemisphere, and it will be the first to accord preeminence to the economic aspects of power. Organized under the auspices of the United States government, it is sponsored also by the national committees of 50 foreign nations. It has the benefit of a substantial federal appropriation, the active participation of individuals and agencies of the government, and the financial, technical, and organizational support of all branches of the privately operated power and power equipment industries of the United States, which in their physical growth and technical progress have been one of the marvels of the twentieth century. It may not be a digression to recall that the growth of these great industries has been marked by the notable frequency of scientific meetings, for which the business and scientific managements of the industries have enthusiastically contributed money, time and effort, to make their conferences models of efficiency and cooperative accomplishment. Under such auspices the success of the Third World Power Conference is assured.

### A broad subject chosen

In the program for this conference, full application has been made of the lessons of the earlier ones. The program has been drawn to develop not merely a collection of studies and discussion of phases of the sciences, arts, economics and social imports of power development and use, but to survey the field in undistorted perspective and with comprehensive vision. The general subject for the conference is the *National Power Economy*. Each participating country has been requested to submit a single national paper, of composite authorship if desirable to secure the most competent treatment, on each of 18 topics into which the general subject has been divided.

The American committee has prac-

tically completed its selection and assignment of authors. Space limitation precludes the presentation here of a list of the authors and papers. However, they will cover comprehensively, but in adequate detail, appropriate subdivisions of each of these broader sectional subjects:

Physical and statistical basis of the national power economy; technical, economic, and social trends.
Organization of the fuel industries.
Organization and regulation of electric and gas utilities.
National and regional planning for most efficient utilization for natural resources.
Special problems in regional planning.
Rationalization of distribution.
National polices.

The American committee's invitations for the preparation of papers have met with generous response from the American scientists. The papers may confidently be expected to present clearly and frankly the experience, the conclusions, the prophecies, even perhaps the misgivings, of the highest American authorities on each subject that has been assigned.

### Conference on Large Dams

The program of the International Commission on Large Dams, the Second Congress of which will be held concurrently with the Third World Power Conference, is substantially different. Formal papers will be presented upon a limited number of technical questions selected and distributed by the central office of the commission. The subjects of these papers are for discussion at the Congress. In addition, brief reports, known as "communications" on other selected subjects are accepted for publication, but are not designated either for presentation or discussion at the sessions of the Congress.

The First Congress (in Scandanavia in 1933) dealt with: (1) Concrete and masonry gravity dams, and, (2) Earth dams. Following these consecutively the program of the Second Congress will be devoted to: (3) Special cement; (4) Design and water-proofing of shrinkage, contraction, and expansion joints; (5) Study of the facing of masonry and concrete dams; (6) Geotechnical studies of foundation materials; and (7) Calculation of the stability of earth dams.

The papers submitted to the conference or the congress are not read at the sessions, but are printed and distributed to members before the meetings, which are devoted to oral discussions. This procedure avoids the possibility of tedious reading aloud of long technical papers not susceptible of attractive oral presentation, which sometimes mars the program of a technical society. Instead, the discussions will be untrammelled by the close limitations of formal writing and will permit the fullest realization of the interest and value of personal presentation and discussion, which manifestly constitute the outstanding attraction of an opportunity of this kind.

### Several short tours planned

In addition to the program of the sessions in Washington, another program to deal exclusively with technical subjects by the method of study tours, eight or ten in number, before and after the conference, is being organized. These technical travel tours are arranged to permit the examination and discussion of the most modern plants, processes and practices in the United States. Each of the tours will last from six to ten days, at least one of which will be devoted to informal open discussions planned in advance and conducted by experts able to interpret the important features of the subjects developed by the tour. The programs will cover such subjects as: coal production, preparation and processing; petroleum refining and research; gas production and distribution; electric stations both steam and hydraulic; railroad electrification and diesel trains; and engineering research. The tours will be held concurrently, so it will be necessary for members to select the tours in which they are most interested, but the pre-conference and the post-conference tours will be indentical and a member can therefore participate in two, if he desires.

### A transcontinental tour

An extensive transcontinental tour of about three weeks' duration has been scheduled after the conference, to take visitors across the United States, stopping at eastern industrial centers, at the great western power developments, and visiting Canada. This tour will be of greatest attraction doubtless to foreign members, but it will afford North Americans, too, an opportunity to see a large part of their country under unusually interesting circumstances.

The conference will also afford many recreational and scientific advantages similar to those which are provided at our own national engineering societies' conventions, except more varied in size, in extent, and in the prominence of the American and foreign visitors.

Washington is, perhaps, the most interesting city in the United States. At this time it is the center from which emanate the authority and the funds for a large proportion of the general engineering construction activity of the country. The capital city is therefore of especial interest now to the engineering profession. The two great conferences on power and on large dams offer a rare opportunity to visit Washington under most interesting auspices, and to make unusual professional contacts, which is not likely to be repeated in this country for many years.

Engineers have recently been through difficult times, which have necessitated extraordinary personal economies, dropping membership in technical societies, modification of former standards of living, finding employment at lower compensation and in work less congenial than would be chosen freely, even in some cases a desperate struggle for livelihood. These times are passing. For most they are definitely over. As we emerge from the world wide depression of unprecedented severity and length, the time is ripe for the application of improvements, technological, scientific, and economic, which have been devised or perfected during the depression period. Rapid strides will be made in the immediate future as stability and confidence are restored. It behooves the engineer to be alert to the trends of new development in his profession, which, changing as it is, may otherwise leave him far behind.

Membership in the Third World Power Conference and the Second Congress on Large Dams is open to all who are interested in these subjects, upon payment of the registration fee of $10. Each member and a lady of his family will be entitled to participate in the sessions and the general social functions in Washington. Copies of the program of the conference and the congress and other information about them may be obtained by application to the American National Committee, Third World Power Conference, 7027 Interior Building, Washington, D. C.

## New York Highway Costs Rise During 1935

The average cost of a concrete pavement 7½ in. thick and 20 ft. wide increased from $25,795 in 1934 to $29,463 per mile in 1935, or 14.1 per cent, according to an official report by the commissioner of highways. The average price per mile during 1935 represented an increase of 21.3 per cent over the 1933 figures and an increase of 44.2 per cent over 1932 prices. The total amount of road work placed under contract during 1935 amounted to a total of 345 miles, including both new construction and reconstruction work.

The report also pointed out that not one highway contract was cancelled during the last year because of failure of the contractor. The elimination of the large number of highway contract defaults was credited to legislation enacted in 1933, making it mandatory for the highway department to hold the certified check of the contractor when bond is furnished until 10 per cent of the work is completed.

The court also points out that the elimination of contractors who are not financially responsible has been aided by banks and bonding companies who must be assured of the contractor's efficiency and good standing.

# Book Reviews and Notes

*A Monthly Commentary on Current Additions to the Civil Engineer's Library*

## Arc-Welding Procedure

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE—3rd edition. Leather; 6x9 in.; pp. 595; tables, diagrams, photographs. Published by The Lincoln Electric Co., Cleveland, Ohio. $1.50.

THIS WELL-KNOWN HANDBOOK, first published in 1933, is now available in a new edition which brings it up to date and expands the original data in line with the progress made in the art of arc welding. Its eight chapters now relate to welding methods and equipment, welding technique, procedure and costs for mild steel welding, structure and properties of weld metal, the weldability of various metals and alloys, designing machinery welding, designing structural welding and welding applications.

## Structures in Seawater

DETERIORATION OF STRUCTURES IN SEA WATER—15th report of the Committee of the Institution of Civil Engineers. Edited by S. M. Dixon and H. J. Grose. Cloth; 6x10 in.; pp. 138; photographs, linecuts, tables. Published in Great Britain by His Majesty's Stationery Office, London. 12/6 net. Also obtainable from British Library of Information, 270 Madison Ave., New York.

RESULTS SO FAR OBTAINED in nineteen years of research into the effect of seawater on timber, metal and concrete are summarized in the 15th Report of the Committee of the Institution of Civil Engineers (Great Britain) and published by the British government under the above title. Since 1920 fourteen progress reports have been published. This volume summarizes the results obtained so far and gives the committee's conclusion based on the data collected to date. The book is divided into four major parts: Preservation of timber; Corrosion of steel and iron; Protection of steel and iron by paint and other preservatives; Deterioration of reinforced concrete. Each section begins with a brief summary of the studies undertaken and the conclusions drawn therefrom. This in each instance is followed by an extended review of the experiments, copiously illustrated, for those who wish more details. In its studies and experiments the committee has had the aid and financial support of the British Department of Scientific and Industrial Research and the dock and harbor authorities in the principal British colonies, thus making possible coordinate studies under a wide variety of climatic conditions.

## The St. Lawrence Deep Waterway

THE ST. LAWRENCE DEEP WATERWAY—A CANADIAN APPRAISAL—By C. P. Wright. Cloth; 5½x8¾; pp. 450; tables, maps. Published by The Macmillan Company of Canada, Toronto, Ont. Price $4.50.

MANY ELEMENTS of the proposed St. Lawrence Waterway Treaty of 1934 are criticized by C. P. Wright in this book, the chief purpose of which is to urge upon Canada and the United States the need for a comprehensive and unbiased study of the economic problems involved in the waterway before negotiation of another treaty is begun. Because he is an economist by training it is natural that the economic side of the projected ship canal should have special appeal to Mr. Wright. On the other hand, his special training, notably his study of Canadian transportation, and wheat movements in particular, give unusual weight to his conclusion that the economic possibilities of the waterway never have been adequately studied, the nearest approach being the Brookings Institution's study of 1929 (The St. Lawrence Power and Navigation Project).

The author is sharply critical of the treaty drafters for their failure to give adequate attention to the matter of canal depth and their perpetuation of the mistake made by those who fixed the depth of the Welland Canal at 27 ft. with 30-ft. depth over the lock sills. He also raises questions as to the equity of the distribution of costs and of river flow for power purposes proposed in the treaty and the treaty's failure to make definite provision for the deepening of the connecting channels of the upper lakes. Again, the author thinks the way in which the the treaty handles the Chicago diversion may prove to be inequitable to either party but certainly to Canada in the long run, and so proposes that Canada should press for a settlement of that question by a separate treaty.

So much biased literature has been written about the St. Lawrence waterway that it is refreshing to find a book that attempts to approach its many questions in a dispassionate manner. If any criticism of the book is to be voiced it is on the score of length. Like Anthony Adverse, it is too long for the busy man to read.

## A Survey of Sanitary Engineering

THE WORK OF THE SANITARY ENGINEER. By Arthur J. Martin. Cloth; 5½x8¾ in.; pages, 488; tables, diagrams, photographs. Published by MacDonald & Evans, London. Price, 16 shillings, net.

THE AMBITIOUS TASK of writing a book that covers the wide scope of sanitary engineering in all its phases has been ably discharged by Arthur J. Martin, the English engineer who is well known in this country through his treatise on "The Activated Sludge Process." From the rich background of many years of lecturing to students, training sanitary personnel in the British army and serving as an examiner of candidates for appointment as sanitary inspectors, Mr. Martin has compiled an informative record of sanitary engineering as it is understood and practiced today. Although it is concerned primarily with English practice, this in no way restricts its usefulness to the American reader who desires to acquaint himself more fully with developments and progress in sanitation.

The contents of the book are divided into six parts. Part I outlines sanitary administration in Great Britain from its historical beginnings up to its present developments and accomplishments. The subject of water supply, forming Part 2, comprises schemes of supply, treatment and distribution and in addition there are three chapters devoted to a brief review of the fundamentals of hydraulics, chemistry, bacteriology and geology.

A section on sewerage systems and appurtenant devices is followed by a detailed review of sewage disposal theory and processes. [illegible]collection and disposal of municipal refuse is thoroughly discussed under Part 5. The volume concludes with chapters on flood control, drainage in relation to disease and land reclamation and coast protection.

Although this book covers a wide range of subject matter, it is detailed enough to provide a comprehensive survey of the work of the sanitary engineer. For this reason it will be found valuable not only for its wealth of interesting background but also as a handbook of reference.

## *Miscellaneous Notes on Booklets and Reprints*

DUST STORMS IN THE CENTRAL WEST last year and their possible effect on health, with special reference to conditions existing in Kansas, are subjects of a paper in Vol. 50, No. 40, of the Public Health Reports issued by the U S. Public Health Service. Among other con-

clusions drawn from this study, it is stated that the dust had a high silica content, and possibly over a long period of exposure to repetitions of the storm the end effects on individuals would be similar to those from exposure to mine and other industrial dust. Copies may be obtained from the Superintendent of Documents, Washington, D. C. Price, 5 cents.

MUNICIPAL HOUSING, a booklet written by Helen Alfred, secretary and director of the National Public Housing Conference, discusses the background and present status of municipal housing in this country, leading up to a consideration of the Wagner Bill now before Congress providing for a permanent federal subsidy to local housing authorities. The booklet is available from the office of the Conference, 112 East 19th St., New York. Price 10c.

THE DEVELOPMENT OF ASPHALT MATTRESS FOR RIVER BANK PROTECTION, a reprint of a paper by W. C. Carey, senior engineer, Second New Orleans District, U. S. Engineer Department, before the Mid-South Section, American Society of Civil Engineers, is published by the Asphalt Institute, New York, as Information Series 25.

A METHOD OF STRESSING THE RODS of reinforced-concrete structures during construction, so that after the load comes on the concrete will be unstressed and the rods will take all of the tension, is given in a new booklet published by the Preload System Co., Grand Central Terminal Building, New York City.

STANDARD SPECIFICATIONS FOR PHOTOGRAMMETRY has been issued by the American Society of Photogrammetry, 724 Ninth St., N.W., Washington, D. C. The specifications cover aerial photography, types of photographs and prints, and the conditions to include in contracts for aerial mapping work. Price, 25c.

A SUMMARY OF CURRENT LITERATURE ON WATER POLLUTION RESEARCH is published monthly by the Department of Scientific and Industrial Research of Great Britain. Information as to subscription rates in this country can be obtained from the British Library of Information, 270 Madison Ave., New York City.

THE HYDRAULICS OF FLOOD MOVEMENTS IN RIVERS, by Harold A. Thomas, has been published by the Carnegie Institute of Technology, Pittsburgh, Pa., as an engineering bulletin. Free.

ADVANCE THROUGH ADVERSITY, a paper by L. K. Silcox before the Engineering Institute of Canada, has been reprinted by the New York Air Brake Co., 420 Lexington Ave., New York. The paper is an explanation of trends in railway equipment design which have developed through modern demands.

THE 57TH ST. BRIDGE, NEW YORK, is the subject of Port Information Bulletin No. 5, the Port of New York Authority, 111 Eighth Ave., New York. The pamphlet outlines how the long-projected 57th St. bridge over the Hudson River conflicts with the Port Authority's "statutory plans."

WATER-SUPPLY CONSERVATION STUDIES, a summary of irrigation district reports and hydrographic investigations coupled with tables of stream discharges in Colorado for the years 1933 and 1934, are outlined in the 27th biennial report of the state engineer.

A STUDY FOR THE PREPARATION of a specification of high-early-strength portland cement has been published by the National Bureau of Standards as Research Paper RP839. For sale by the Superintendent of Documents, Washington, D. C. Price 5c.

THE MUNICIPAL SMOKE PROBLEM, a brief treatise on the products of combustion of fuels and their effect. Mellon Institute of Industrial Research, Pittsburgh, Pa. Free.

LABORATORY TESTS ON STRUCTURAL ASSEMBLIES OF BRICK AND TILE. Published by the Department of Mines (Canada), Ottawa, Ont. Price 10c.

SOME FUNDAMENTALS OF HIGHWAY IMPROVEMENT is the subject of Extension Series No. 34, Engineering Extension Department, Purdue University, Lafayette, Ind. Free.

DESIGN AND CONSTRUCTION OF BUILDING EXITS, National Bureau of Standards, Miscellaneous Publication M1511. For sale by the Superintendent of Documents, Washington, D. C. Price, 10c.

THE STRENGTH OF MONOLITHIC CONCRETE WALLS is the subject of Bulletin No. 277, Engineering Experiment Station, University of Illinois, Urbana, Ill. Price, 40c.

A YEARBOOK OF RAILROAD INFORMATION, 1935 edition, has been published by the Committee on Public Relations of the Eastern Railroads, 143 Liberty St., New York. Free.

"SECRETS OF A SHIP CANAL" is the title of a paper by Alfred F. Harley, published by the Budget and Finance Committee, City Council, Jacksonville, Fla. It is a description of the Manchester ship canal development in England.

SEATTLE MUNICIPAL LIGHT AND POWER SYSTEM, a report on past record and projected future growth. Published by the Municipal League of Seattle, Seattle, Wash.

## *New Books and Revised Editions*

*[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]*

THE PORTS OF SAVANNAH AND BRUNSWICK, GA.—Port Series No. 10 (Revised 1935). Prepared by the Board of Engineers for Rivers and Harbors, War Department. Paper; 6x9 in.; pp. 182. Maps, tables, photographs. For sale by Superintendent of Documents, Washington, D. C. Price 40c.

THE PORTS OF TEXAS CITY AND CORPUS CHRISTI, TEX.: Port Series No. 6—Part 3 (Revised 1935). Prepared by the Board of Engineers for Rivers and Harbors, War Department. Paper; 6x9 in.; pp. 125. Maps, tables, photographs. For sale by the Superintendent of Documents, Washington, D. C. Price 35c.

THE PORTS OF PUERTO RICO—Port Series No. 21 (Revised 1935). Prepared by the Board of Engineers for Rivers and Harbors, War Department. Paper; 6x9 in.; pp. 130. Maps, tables, photographs. For sale by the Superintendent of Documents, Washington, D. C. Price 25c.

DESCRIPTIVE GEOMETRY—By C. H. Schumann, Jr. Second edition. Cloth; 6x9 in.; pp. 336; tables and linecuts. Published by D. Van Nostrand Co., Inc., New York. Price $2.75.

PLATFORM FOR AMERICA—By Ralph E. Flanders. Cloth; 5½x8 in.; pp. 118. Published by Whittlesey House, McGraw-Hill Book Co., New York. Price $1.00.

THEORIE DER SETZUNG VON TONSCHICHTEN—Eine Einfuhrung in die Analytische Tonmechanik. By K. v. Terzaghi and O. K. Frohlich. Paper; 7x10 in.; pp. 166; tables and linecuts. Published by Verlag Franz Deuticke, Leipzig and Vienna. Price RM 14.40.

MATERIALS OF ENGINEERING—By Herbert F. Moore. A textbook; cloth; 6x9 in.; pp. 419; photographs, linecuts, tables. Published by McGraw-Hill Book Co., New York and London. Price $4.00.

LEGAL AND ETHICAL PHASES OF ENGINEERING—By C. Francis Harding and Donald T. Canfield. Cloth; 6x9 in.; pp. 432; tables. Published by McGraw-Hill Book Co., New York & London. Price $4.00.

DER KAMPF DES INGENIEURS GEGEN ERDE UND WASSER IM GRUNDBAU—By A. Agatz. Cloth; 6½x10 in.; pp. 276; photographs, linecuts, tables. Published by Julius Springer, Berlin. Price RM 26.40.

ARCHITECTURAL GRAPHIC STANDARDS—Second edition. By Charles George Ramsey and Harold Reeve Sleeper. Cloth; 9x12 in.; pp. 284; linecuts. Published by John Wiley & Sons, Inc., New York. Price $6.00.

EPIDEMICS AND CROWD-DISEASES—An Introduction to the Study of Epidemiology. By Major Greenwood. Cloth; 5 x2x9 in.; pp. 409; linecuts and tables. Published by Williams & Norgate, Ltd., London; The Macmillan Co., New York. Price $5.50.

THE CHEMICAL ANALYSIS OF WATER AND SEWAGE—A Laboratory Manual. First Edition. By E. F. Eldridge and F. R. Theroux. Cloth; 5x8 in.; pp. 201; tables. Published by Edwards Bros., Inc., Ann Arbor, Mich.

THE MUNICIPAL YEAR BOOK—1936. Edited by Clarence E. Ridley and Orin F. Nolting. Cloth; 6½x10 in.; pp. 475; linecuts and tables. Published by the International City Managers' Association, Chicago. Price $4.00.

# Letters to the Editor

## Muskingum Effect on Ohio Floods

Sir—A statement is made in your editorial "Wanted—A Flood Control Policy" in the issue of April 9, 1936, that the value of the Muskingum flood control project is wholly local, and that, in fact, it may intensify the Ohio's floods. I wish to point out that this statement is in error.

The Muskingum Flood Control system consists of fourteen gate-controlled flood-control reservoirs. Marietta, located on the Ohio River, is part of the Muskingum system. The plan was so designed as to reduce flood crests on the Ohio River at Marietta and, consequently, at other points below on the Ohio River, including Cincinnati and Louisville. It is estimated that, had the Muskingum flood-control plan been in effect at the time of the March, 1913, flood the maximum stage at Marietta would have been reduced 6.3 ft., and the maximum stage would have been reduced by approximately 3 ft. at Cincinnati, with corresponding reductions above and below. The effect of the system on other floods would depend, of course, on rainfall distribution.

Since Marietta is included in the benefited area of the Muskingum Valley project, the reservoirs would always be operated to effect a reduction in the stage at Marietta; this is possible due to the fact that the system is completely gate controlled.

The Muskingum River's position near the headwaters of the Ohio makes it very improbable that, through manipulation and operation, the flood crest on the Ohio at any point, under any conditions, could be increased.

Your attention is invited to the fact that federal participation in the Muskingum project was based, to a considerable extent, on the benefits from the project to areas outside the state of Ohio, notably West Virginia and Kentucky.

J. D. ARTHUR, JR.,
Lt. Col., Corps of Engineers,
District Engineer.

Zanesville, Ohio,
April 16, 1935.

THE EDITORIAL statement mentioned in the first paragraph of the above letter should have read, "The value of the Muskingum flood-control project is *primarily* local," since we had no intention of saying that downstream influence will not be realized. We believe, however, that it will be difficult or impossible to assure this favorable effect under the conditions of every flood. The timing of flood runoff in the Muskingum valley as compared with that in the upper tributaries of the Ohio is not subject to fixed rule, and the likelihood that the Muskingum detention can be so operated as to avoid coincidence of the Muskingum discharge with an Ohio flood crest is, therefore, subject to uncertainty. Col. Arthur himself, in fact, avoids saying that the Ohio flood crest cannot be increased by the Muskingum system, and limits himself to saying that such effect is "very improbable."

The point at issue is important because it relates to one of the unavoidable limitations of reservoir flood-control, namely the limitations imposed by man's inability to foretell coming weather events. When headwater reservoirs are filled by a storm occurring in the early part of the highwater season it will always be prudent to empty them as soon as possible in order that they may be ready for the runoff of another storm. If the flow that results from such reservoir discharge then should meet a flood wave coming down the main river from other tributaries a coincidence of high stages may occur. No doubt the resulting stage and discharge will always be less than the worst condition occurring under uncontrolled streamflow, and from this point of view headwater storage will always have some value all the way down the lower river course. In the case of the Ohio, however, with uncontrolled flow from the streams above the Muskingum, a discharge of stored flood waters down the Muskingum valley may under proper conditions add to the volume coming down the main river and thus intensify the flood.

Obviously this condition does not argue against the reality of benefits from the Muskingum project to areas outside the state of Ohio. —EDITOR.

## Peening Welds

Sir—In the letter by A. W. Carpenter in your issue of March 26, 1936, relative to peening arc welds and referring to the writer's letter which apeared in your issue of November 7, 1935, it is asked whether cases of failure due to the peening of welds can be cited and what practical substitute-procedure can be offered. A few examples of actual failures of peened welds might be cited, such as the Tiverton tank failure which, unfortunately was never discussed publicly except for the report in your issue of December 14, 1933.

Referring to the example of a welded bridge deck, which entered into this discussion at its beginning, the writer offers the following general suggestions for circumventing the difficulty without the use of peening:

1. Use the smallest amount of weld metal possible in all the joints, because the more heat applied in welding, the greater will be the shrinkage. Accomplish this in the deck plates preferably by fillet welding each edge of these plates to the floorbeams and transverse joists in lieu of the butt and bond welds, which are incidentally much more costly than fillet welds, except in thin plates. This one change in itself would likely remove so much of the cause of trouble that only very simple precautions would have to be taken with regard to the sequence of welding. If butt and bond welds are used, hold the gap and the angle of chamfer to the minimum possible.

2. Use an arrangement and sequence of welding that will provide free movement as long as possible for all pieces affected by the welding. Leave the forward ends of all stringers free until all welding is completed up to the next transverse joist behind these ends.

If it were felt that butt and bond type joints had to be used, one should shift them so that they would all lie over transverse joists and none over the floor beams; and then the transverse joists could be supported on angle seats, delaying the welding of these joist connections until after the deck plate has been fully welded. This has the disadvantage of sacrificing the continuity of the transverse joists which must in this case be fillet welded rather than butt welded. Fusion between the butt and bond welds and the longitudinal stringers must be obviated by the insertion and subsequent removal of small thin strips of copper.

Even with butt and bond welds located over the floorbeams, serious distortion could be avoided by leaving the forward ends of the stringers free as long as practicable and by arranging the sequence of welding so as to avoid accumulative distortions. If it were found necessary, each plate could be weighted down while being welded to the adjacent plate.

These suggestions are not based upon theory alone but have been based upon descriptions of work actually performed, which have come to the writer's attention.

If extreme care is justified in reducing distortion and shrinkage stresses down to an absolute minimum there are other refinements that can be added such as beginning the welding at the center of the span and proceeding toward the ends; carefully controlling the sequence of welding of various parts of the stringer-to-floorbeam connections and transverse joist-to-stringer connections; springing floorbeams ahead slightly to allow for shrinkage in making stringer-to-floor beam connections, etc.

LAMOTTE GROVER,
Office Bridge Engineer,
State Highway Commission.

Topeka, Kansas,
April 6, 1936.

## Earthquake Design

Sir—On Feb. 27, you published a criticism of the policies of the California state division of architecture, signed by Jacob J. Creskoff, Philadelphia engineer.

Since the earthquake of March 10, 1933, I have acted as consulting structural engineer on construction and reconstruction of 42 school buildings, most of which were in the destructive zone. This work of the California state division of architecture has resulted in great betterment of construction of public buildings, and is based upon experience embodying the lessons of the San Francisco, Santa Barbara and Long Beach earthquakes.

School buildings in California are very seldom more than two stories in height, and contain rigid cross-walls, stair-walls and end-walls, in addition to other stiff membranes. It would have been more interesting if the writer of the criticism had suggested how his theories could be put to actual use on actual practical problems of this type. Undoubtedly, the dynamic problem should be considered in tall buildings, towers, tanks, high bridges, etc., but on the other hand I feel confident that if Mr. Creskoff investigated a few of

the school structures of the rigid type he would arrive at the same assumptions that are being used by the California state division of architecture.

FRANCIS N. DLOUHY.

Los Angeles, Calif.,
March 4, 1936.

## Steel for Turnbuckles

Sir—The growing interest in the use of steel piling for permanent civil engineering construction work has resulted in renewed attention being devoted to the various component parts of such structures. Among these, steel turnbuckles naturally occupy an important place in joining up the sections of tie-rod used for transmitting loads from a steel pile wall to the anchorage provided.

It has been a generally accepted practice to use forged steel castings for such turnbuckles, in view of the greater confidence which can be placed in forgings for carrying such long-time tensile forces. In view of the advances made in the casting of steel in recent years, it would appear to be fitting to review this preference for forgings, especially as the problem is not confined to piling work, the provision of shoes for wood stave pipe bands being a parallel case.

It may usefully be mentioned that on the continent of Europe even forgings are not used in some cases for the purpose indicated, preference being given to standard round steel bars of appropriate diameter, milled out as required and tapped with the necessary thread.

The three types of connection have each some favorable features. Would it be possible for engineers who have had experience in this matter to communicate their findings and opinions on this important detail of design for the benefit of other engineers through the medium of your pages? ROBERT F. LEGGET.

Montreal, Que.
March 12, 1936.

## Student Road Builders

Sir—In reference to your recent account of the Road Show held in Cleveland in January, I wish to add the following concerning the part taken by our student chapter of the American Road Builders' Association.

Our chapter was organized in 1933, and I believe furnished the groundwork for the recent organization of the Educational Division, which now includes 152 chapters.

The University of Pittsburgh student chapter prepared a photographic exhibit showing student work in our bituminous and cement-testing laboratories, campus scenes, and scenes of our summer surveying at Camp Hamilton, Windber, Pa. This was shown in the educational section of the show in a booth furnished us by the A.R.B.A.

The entire junior and senior civil engineering classes attended the Road Show and convention at Cleveland, and part of the same group attended the Highway Research Board meeting at Washington, D. C., last December.

We do appreciate the privilege accorded us to become a part of so powerful a factor in the highway field and the cooperation extended us in educating these young men in their chosen field.

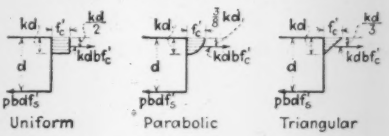
A. DIEFENDORF,
Dept of Civil Engineering,
University of Pittsburgh.

Pittsburgh, Pa.,
Feb. 17, 1936.

## Flexure Theory for Reinforced Concrete Needs Revision

Sir—According to H. M. Hadley, in your issue of Feb. 20, 1936, concrete has the remarkable property, different from all other known building materials, of being able to sustain a much greater ultimate compressive strength in flexure than in concrete cylinders; he points out that this happens especially in highly reinforced-concrete beams.

THEORIES OF DISTRIBUTION of compression in reinforced-concrete beams.




Everybody knows that this does not happen in steel, cast iron or wooden beams. Why ascribe to concrete this wonderful property? Careful tests on concrete beams, even highly reinforced, never showed larger unit deformations at ultimate loads than 0.0015 to 0.002, and we have plenty of extensometer tests published which give the stresses at these unit deformations according to the grade and consistency of the concrete.

The discrepancy between figured and possible and actual concrete strength must be ascribed to the so-called accepted theory of flexure, which is greatly at fault. We have to admit that this theory gives safe results, which certainly was a plausible reason 40 years ago for its adoption; at the present time, however, this theory has been given up by all real concrete experts, even by those who advocated its use originally. It does not lead to a proper understanding of reinforced concrete and invites unbalanced designs.

This theory was developed in the last decade of the nineteenth century in protest to the empirical formulas used by the pioneer concrete engineers. These engineers noted in their tests of reinforced-concrete beams to destruction that the concrete was cracked from the bottom to a varying distance from the top, depending on the amount and kind of reinforcing steel, and assumed that the part of the beam above the cracks was in compression.

One prominent designer assumed a uniform compression above the crack, while a competing designer assumed a triangular distribution.

For the former,

$$kdbf_c' = p\ bd\ f_s';\ k = p\ f_s'/f_c';$$
$$M = p\ bd^2\ (1 - k/2)$$

For the latter Fig. 1b:

$$kdb\ f_c'/2 = p\ bd\ f_s';\ k = 2pf_s'/f_c';$$
$$M = p\ bd^2\ (1 - k/3)$$

By allowing an ultimate compressive strength of 2,000 lb. per sq.in. and a steel stress equal to the yield point, these pioneer engineers obtained a fair agreement with their tests.

The straight-line deformation of the cross-section on which the accepted theory is based has not been observed in a single careful test, and how engineers all over the world have accepted this misleading conception for so many years is impossible for me to explain. The theory is more guesswork than that of the pioneers, and I certainly never used it in all my practice.

I published in the *Journal* of the American Concrete Institute of December, 1914, an improvement of the old theory of the pioneers of the concrete industry. It was based on many hundred tests by American and foreign investigators and showed that the best agreement with tests to destruction can be obtained by assuming:

1. The ultimate unit compressive strength in flexure equals nearly the cylinder strength.
2. The stress distribution of the concrete in compression is accordingly a parabola.
3. The ultimate tensile stress in the reinforcing steel is greater than the yield point and equals 43,000 lb. per sq.in. for mild steel and 72,000 lb. per sq.in. for high-carbon steel.

For parabolic distribution:

$$kdb\ f_c'\ 2/3 = p\ bd\ f_s';\ k = 1.5\ p\ f_s'/f_c'$$
$$M = p\ bd^2\ (1 - 3k/8)$$

The formulas given in this discussion are simpler than those of the accepted theory, they are more easily derived and more correct and agree within 5 per cent, up or down, with the tests by C. B. McCullough (*ENR*, Sept. 19, 1935) when $f_c'$ is assumed at 4,000 lb. per sq.in. and $f_s'$ to equal 45,000 lb. per sq.in.

The only new feature which the writer would add today to the assumptions published 22 years ago is the probability that we canot develop in the reinforcing steel a higher tensile strain than 0.005 in. per in. It seems the concrete cannot follow this strain in compression or shear. Hence, piano wire of a strength of 300,000 lb. per sq.in. would be useful only up to a stress of $30 \times 10^6 \times 0.005 = 150{,}000$ lb. per sq.in. We can find the utilizable stress of any reinforcing material by observing the stress in a testing machine at which the unit strain is 0.005.

We need a better understanding of the mechanics of reinforced concrete and the adoption of a sensible factor of safety rather than fancy design stresses in my opinion.

L. J. MENSCH,
Consulting Engineer.

Chicago, Ill.,
March 4, 1936.

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## *Debunking Roadside Art*

SANE DEFINITION of roadside improvement is so rare that a recent circular of the Florida state highway department describing its purpose challenges notice. Roadside improvement, says the official circular, is "nothing but straight out construction—just stepping construction up to a higher plane." In more words, roadside improvement is just logical alignment, wide right of way, broad shoulders, shallow ditches and flat slopes with natural vegetation kept neat and trim by good maintenance. Safety, easy maintenance, room for growth and good care make such a road artistic in its fitness to purpose. The result is a true road and not an arty hybrid. The Florida highway officials deserve credit for making roadside beautification understandable without a special course of training in a language intelligible only to the cultist.

## *Bridge Neglect*

TOLEDO WOKE UP one morning not long ago to find it had one of the country's prize collection of wornout and under-maintained bridges. It had been startled a few weeks previously when one of these old structures collapsed into the Maumee River without warning; the engineers of the city seized the opportunity to impress upon the administrative officials and the populace what they had vainly tried to describe to them previously—the danger that lurks in skimping bridge maintenance and repairs. The report made on the Toledo bridges, as abstracted in this issue, is dedicated to every city official in the land, and few of them there are who can read it with any feeling of superiority over Toledo. Toledo, as a matter of fact, has started the repair of its bridges; in many other cities under-maintenance is still taking its toll. Thorough and expert investigations of municipal bridges would reveal a condition that would impress even the cynical taxpayer with its seriousness. Toledo was lucky in that no one was killed when one of its old bridges collapsed; other cities may not be so fortunate.

## *Put Your House in Order*

THE CITY ENGINEER engaged in the complex administration of the layout and physical development of his municipality is also entrusted with the further responsibility of maintaining permanent and easily accessible records of his work. There is no need to comment at length on the reasons; the fundamental importance of up-to-date records quickly available for ready reference is recognized in every form of business endeavor. The article in this issue describing how the city of Fort Dodge undertook the task of compiling and indexing engineering records that had "accumulated" over a period of 70 years sets an example and points a moral for municipal engineers. The positive negligence in systematizing and maintaining properly indexed records that characterizes many a city engineer's office is deplorable, especially in view of the fact that professional training emphasizes system and preciseness. To discharge his responsibility faithfully and to be ready to take fullest advantage of the new opportunities in this era of broad public works planning, every municipal engineer should heed the call to put his house in order.

## *In the Test of Flood*

EVER SINCE the Clinch River dam at Cove Creek, Tenn., later named the Norris Dam, was begun there has been doubt whether the reservoir would prove tight, since the limestone rock of the region is greatly subject to cavern and sink hole formations. Hostile pens did not hesitate to predict that the reservoir would be unable to hold water. Readers of *Engineering News-Record* will recall our accounts of the extensive foundation grouting done under the dam; even more extensive and far-reaching grouting has been done behind the abutments, to close any seams or fissures in the rock and to supplement the filling of the large cavern near the top of the dam in the right abutment. Now comes the good news that this carefully executed work has been successful. The March and April rains brought so heavy a runoff down the Clinch and Powell rivers that the reservoir is now full to within about 20 ft. of the crest, and its storage amounts to more than a million acre-feet. With the water well above 200 ft. deep behind the dam, not a drop of leakage or outflow has been observed, either at the dam abutments or in the countryside round about the reservoir, where the flow of every spring has been under observation to determine any increase from the filling of the reservoir. The latest reports, indicating that the reservoir will prove to be bottle-tight, show that modern efficiency and thoroughness in grouting are able to overcome even serious difficulties from cavernous rock structure.

## *Welding on the Job*

WELDING AS A TOOL of construction is usually thought of in connection with the fabrication and installation of permanent equipment, and because of the rapid advance of the art in this field—in the welding of pipelines, penstocks, tanks, bridges and buildings—its details have been followed with close technical interest. The equally important application of welding to the repair and maintenance of construction plant has been much less obtrusive. That development in this field is almost as great as in the field of permanent installation becomes clear from the account of experience at Fort Peck dam given elsewhere in this issue. On this huge but isolated project, far from sources of supplies and repairs, the engineers had to provide means for keeping a vast array of heavy equipment in operation despite inevitable breakdowns and abnormal wear resulting from handling highly abrasive materials. By laboratory research, by unusual procedure involving ingenious jigs, and by aid of one of the best-equipped welding shops in the country, they have advanced equipment repair welding to a new high degree of efficiency and effectiveness. The greatest part of the work done is in rebuilding worn dredge pumps and cutter heads, but the shop also carries on as part of its regular schedule the repairing of all kinds of equipment, from replacement of a small tractor casting to the welding of a broken 27-ton dredge spud. The extent of these repair operations is indicated by the consumption of welding rod, which averages three tons per week.

The magnitude and ingenuity of the Fort Peck maintenance work focuses attention on the importance of welding in this department of construction; and while the Fort Peck case attracts prime attention because of its huge proportions the art is proving equally indispensable on many construction jobs of quite ordinary size.

## Safeguarding Against Pollution

CITIES that take their water from Lake Michigan present surprising contrasts in the matter of water pollution and the safeguarding of public supplies. Thus, Milwaukee elected to build filtration works, after spending millions for sewage disposal; then, before the filters are even completed, it is caught by pollution carried to its intakes by abnormal storm-water overflows. In contrast, Indiana cities to the south of Chicago built filters first, and continue to pollute the lake from which their supplies are taken—so far without harmful results. Following a course different from either of these, Chicago invests heavily in sewage treatment and builds no filters; yet its water is polluted so seriously by the sewage of the Indiana towns that "chlorine cocktails" are the usual thing in the city's South Side, and at the same time chlorine absorption by organic matter is so high that the limit of effectiveness of the treatment is approached.

Chlorine was once considered to be the first line of defense against unsafe water, and filtration to be a finishing treatment only. But now that amœbic dysentery has proved to be a water-borne disease not capable of full control by chlorine, the order of merit is reversed and filters again become the primary safeguard of water purity. Nowhere does this truth have more pertinent application than at Chicago: The city's strenuous efforts to keep its sewage out of the lake by diversion and by preventing stream storm reversals of the river flow are paralyzed by the continuous outpouring of sewage on the part of the industrial suburbs to the south through the Indiana Ship Channel and the Calumet River. The latter source of pollution will become even more menacing when the westward diversion of lake water is cut to 1,500 sec.-ft. three years from now, at the time the Supreme Court ruling goes into effect.

The situation of Chicago's water supply thus is an immediately serious one, especially as nothing is being done to control the pollution. There is some hope that the Calumet pollution can be reduced by the cooperation of the industries responsible for its chief contributions of contaminating wastes. There is also some hope that, given sufficient time, something may be done about the Indiana phase of the problem, which is interstate in character and may possibly call for federal intervention. But such remedies are in the future, and the city's concern is immediate. Yet Chicago has done nothing and is doing nothing to protect its water by filtration.

With all of the PWA millions that were available for just this kind of public improvement it is fair to ask why filters were not built long ago. Plans have been available for some years, financing is feasible, and all needed legislation has been enacted. A few legal difficulties blocked the project on first application to the PWA, but unquestionably they could have been overcome just as similar obstacles were overcome on projects of less direct public interest.

The real answer to the question of why the most urgent and soundest improvement project in Chicago continues to be delayed is that it has not seemed good politics to build filters. Chicago must cut its water consumption—by metering or waste prevention or both—before it can proceed to filtration on any feasible basis of economy. Any move toward waste prevention, however, is feared as plain political suicide. Strange as it may seem the small consumers, who make up the majority of the voters, would pay lower water charges if their services were metered; but because ward committeemen and aldermen are incapable of appreciating this fact they continue hostile to the needed metering campaign.

Perhaps Chicago must go through the experience of a major epidemic of water-borne diseases before its governing authorities take action to safeguard the city's supply. Pending that time its policy of millions for sewage treatment and not one cent for filters represents the strangest paradox in current American water history.

## Opportunity and Progress

THE TRULY REMARKABLE advance in cable spinning methods that is being demonstrated on the Golden Gate Bridge at San Francisco affords another instance of the dormant resources of construction organizations that are revealed when occasion calls for them. Because of predominance of relief-labor projects during the last few years, relatively few opportunities have been given to engineers and contractors to test their mettle. Boulder Dam was an exception; there are others, but they are not numerous. Consequently when an operation like cable-spinning that has been done at one rate for many years is suddenly speeded up 600 per cent (as measured by wires laid per cable), it acts as a shot in the arm to reenergize construction.

It might be thought that such a sudden advance reflects on the versatility and progressiveness of those who for so long followed the cable-spinning formula laid down on the Brooklyn Bridge. This is not the case, however, because until the Delaware River Bridge was built the requirements were no greater than on the earlier bridges, and the money for more elaborate plant was not available in the contract price. With the Delaware Bridge it was required to build a cable twice as large as ever before; the machines and the methods were readily developed. Next, on the George Washington Bridge, it was necessary to place as much wire in its four cables as was used in the next seven largest bridges combined; speed was essential, and new equipment satisfied this requirement. Still more speed was required at Golden Gate, and again the demand was met, but in a wholesale manner that has few counterparts in construction.

Where four wires were laid in a cable on all previous jobs, twenty-four are being strung across the Golden Gate, using such new gadgets as triple spinning wheels and split tramways. Other improvements are cited in the article in this issue, such as a new cable makeup and the elimination of tramway bents on the foot walks. Next week an account of the cable spinning on the San Francisco-Oakland Bridge will give further evidence that ingenuity, vitality and progressiveness in construction were not victims of the depression but remain strong and active and ask only an opportunity to show their capabilities.

# CURRENT NEWS

## Power Economics At Midwest Meeting

**Design factors for structural safety of power plants among engineering topics at Midwest Power Conference**

SOME half-dozen of the 34 papers presented at the Midwest Power Conference held April 20-23 in Chicago were of direct interest to civil engineers. Sessions sponsored by the Illinois Section of the American Society of Civil Engineers and by the Western Society of Engineers provided the background. While other founder and local societies were represented and swelled the general session attendance to 400 the separate meetings were disappointingly small.

Gen. Charles Keller presided over the American Society of Civil Engineers' session on power plants and dams. P. E. Stevens, of the Byllesby Engineering and Management Corp., in a helpful paper on "The Influence of Earthquakes on Power Plant Design," gave new recommendations as to design factors to be used to provide structural safety for various parts of a power plant. Methods of strengthening four buildings of the San Diego power plant were outlined in detail. The Fort Peck Dam construction methods, camp facilities and progress were outlined by Capt. C. H. Chorpening, assistant to Col. T. B. Larkin, district engineer.

### Federal power development

Engineering economics in the national power picture drew the largest attendance and evoked long discussions. Gordon Fox, vice-president, Freyn Engineering Co., spoke on "Engineering Criteria of Economic Power Supply" and Arthur E. Morgan, chairman of the Tennessee Valley Authority, was on the program to present the subject "The Nation's Power Supply; Its Economic Development Under Government Participation," giving a description of TVA plants and organization.

Frank F. Fowle, president of the Western Society of Engineers, covered power development under private enterprise. He analyzed all of the federal developments, largely from data obtained from reports of the Federal Power Commission. He discussed power in terms of production, distribution and consumption. The high unit cost of federal development, $250 per kw., was compared with the $85 average plant investment of the private utilities. Another comparison showed that the cost of transmitting electricity is 2.6 times the cost of hauling coal for distances of 50 to 200 mi. Cooperation of the government with private utilities rather than competition with them was his final recommendation.

### Public works economics

Frank D. Chase, president of the conference, outlined in his opening remarks the rôle of the engineer in public works. His theme paralleled that presented to the Economics and Finance Division of the American Society of Civil Engineers at the January New York meeting by the committee on governmental expenditures for public works. Principles suggested were as follows: Undertakings should be based on sound economic considerations. Projects should be only those which cannot be handled by private capital, should not duplicate or impair legitimate existing facilities or properties, should be classified in order of relative merit, including consideration of location with reference to centers of unemployment and labor used, and none not justified on the above basis should be undertaken merely to furnish work. Mr. Chase suggested also, as had the American Society of Civil Engineers' committee, that a non-partisan board of public works, similar in character to the Supreme Court be set up for the determination and administration of public works programs.

## Planning Commission Proposed in New York Charter Revision

A revised city charter providing for a city planning commission with broad powers, has been proposed by the New York City Charter Revision Commission for submission to the voters this fall. Under the new charter a department of housing and building would replace the present tenement house department and the building bureaus of the five borough presidents.

The City Planning Commission would consist of six appointive members and the chief engineer of the Board of Estimate. Each member of the planning commission would serve for eight years but the first appointments would be short so that only one vacancy would occur in any one year. The commission would have the duty of preparing and keeping a master plan of the city and it would consider all public improvements, changes in the map and zoning changes which now come before the Board of Estimate. The City Planning Commission would also have the power of making a capital outlay budget of authorized capital improvements for each year, together with a program for the following five years.

The department of housing and building would have control over the construction and maintenance of buildings and the issuance of various necessary permits. Each borough would have a superintendent whose decisions would be subject to review by the Board of Standards and Appeal.

A new Department of Public Works will take over the functions of the present Department of Plants and Structures in addition to the maintenance of public buildings and the construction of intercepting sewers and sewage disposal plants. Another reform proposed in the charter is a plan to bring all expenses, except for docks, water supply and subways, under a plan that would in 20 years require all capital improvements to be financed by tax notes which must be redeemed in the succeeding budget.

## Civil Engineers Hold Spring Meeting

**Mississippi flood control, cut-offs and mosquito control command attention at A.S.C.E. meeting in Hot Springs, Ark.**

THROUGHOUT the technical sessions on construction, waterways and sanitation, the work which is now being done in the Mississippi Valley served to illustrate the papers presented to the 83d annual spring meeting of the American Society of Civil Engineers at Hot Springs, Ark., April 22-25. The meeting was opened by George R. Clemens, president of the Mid-South Section.

At the opening session, an address on the engineering problems of the Mississippi Valley and their relation to the country as a whole was presented by Grover T. Owen, who outlined the progress of flood control work in the lower Mississippi Valley and tributary basins. He also pointed out the need for the establishment of a flood prevention program. Mr. Owen referred extensively to the recent report of the Army Engineers on a comprehensive reservoir system and urged active consideration of that report, particularly the sections dealing with the White and Arkansas River reservoirs.

The general session of the society was conducted by D. H. Sawyer, vice-president. A paper on industrial development in the Lower Mississippi Valley by H. C. Couch, president, Arkansas Power & Light Co., was presented. The future of the railroads in the area was discussed by L. W. Baldwin, president of the Missouri Pacific R.R. Oil and gas resources and many pertinent comments on their development and potentialities were included in a paper given by Col. T. H. Barton, president of the Lion Oil Co. A paper by Earl W. Hodges, New York, on the undeveloped resources in the Mid-South concluded the session.

### Flood control work

Mississippi River flood control work was the outstanding feature of the discussions in the technical sessions: waterways, sanitary and construction. At the morning session of the waterways division, Gen. H. B. Ferguson, president of the Mississippi River Commission, gave moving pictures of aerial views of the cut-offs along the Mississippi River. The picture showed the views taken from a flight up the river, showing how the original channel had been straightened by the cut-offs. Also included among the pictures was the dynamiting of the plug at the Ashbrook cut-off, with the water rushing through to complete the twelfth cut-off which is the farthest upstream of the series. Captain Orville E. Walsh, assistant to the division engineer, Kansas City, presented a paper outlining the progress made in flood control work on the Missouri River.

At the afternoon session the rail-water transportation problem was presented. R. W. Putnam, president of the Maritime

Engineering Co., Chicago, traced the history of waterway improvement and developed the costs of carrying freight by water, showing the advantages and disadvantages of waterborne commerce. The railroad case was presented by S. L. Wonson, assistant chief engineer of the Missouri Pacific R.R. He compared rail and water transportation costs and urged the termination of a free waterway policy in which maintenance costs for freight are greater than rail rates.

### Mosquito control recommended

During the sanitary session, presided over by M. Z. Bair, state sanitary engineer of Arkansas, the recently completed Hot Springs sewage treatment project was discussed by E. L. Filby, assistant engineer for Black & Veatch of Kansas City. Col. J. A. LePrince, senior sanitary engineer, U. S. Public Health Service from Memphis, discussed malarial control in the Mississippi Valley and cautioned engineers to include plans for such control in their water conservation planning in order to avoid developing a serious condition as to general health. Recent development in waterworks projects in the Mid-South were discussed by Charles B. Burdick, Chicago, in a paper which concluded the session.

A description of the Fort Peck Dam project was presented by Maj. Clark Kittrell for Col. T. B. Larkin, district engineer at Fort Peck, during the afternoon session of the construction division which was presided over by George R. Clemens. Maj. Kittrell indicated that the Army Engineers would complete the job by 1939, considerably ahead of the originally estimated date of completion. G. H. Matthes, of Vicksburg, a member of the consulting board for Conchas Dam in New Mexico, gave an account of the work done to date and the plans for construction of the dam. The session was closed by a paper prepared by N. F. Helmers of Siems-Helmers, Inc., St. Paul, Minn., on the foundation work at the New Orleans bridge.

On the third day of the meeting a large group of members went, by special train from Hot Springs to Arkansas City, Ark., where they boarded a Vicksburg Engineer District boat. Gen. Ferguson and Lt.-Col. Oliver, of Vicksburg, conducted the party on an inspection of the three cut-offs on the Mississippi River, the Ashbrook, Tarpley and Leland, that eliminate the famous Greenville bends (*ENR*, Feb. 20, 1936, p. 269). In less than two hours the boat, carrying the group traveled from Arkansas City to Lake Village Landing, a distance that had previously been 50 mi., but which is now shortened to about 20 mi.

## Residence Requirement Waived For Detroit Examinations

In announcing examinations for positions as assistant civil engineer, assistant mechanical engineer, and assistant electrical engineer, the Detroit Civil Service Commission has waived residence requirements, but non-residents are expected to take up residence in the city if they accept the positions. The examination for position as assistant civil engineer is to be held on May 5. Applicants living more than 150 mi. from Detroit will be examined at points convenient to them. The examination for assistant mechanical engineer is to be held on May 15 and the examination for assistant electrical engineer on May 18.

# Senate Resolution Calls for Topographic Mapping Program

**Possibility of speeding up topographic mapping by greater use of aerial photography and by other means object of Senate resolution asking Interior Secretary to submit an economical program—Consolidation of agencies discussed**

*Washington Correspondence*

A RENEWED EFFORT to expedite the topographic mapping of the United States is represented in a resolution adopted by the Senate requesting the Secretary of Interior to submit to Congress next January an economical program, together with an estimate of the time and cost of compietion on the basis recommended.

The resolution requesting the report was sponsored by Senator Hayden, of Arizona, and adopted by the Senate April 17 after a similar provision written into the Department of Interior appropriation bill by the Senate Appropriations Committee was eliminated by lack of agreement in conference with the House managers of the bill.

### Plan to speed mapping

Senator Hayden's object is to explore the possibility of speeding up the mapping program by greater use of aerial photography and of reducing the cost by including less detail. He desires to push the mapping program but is dubious concerning the prospect of winning effective support for the plan submitted in November, 1934, by the U. S. Board of Surveys and Maps calling for completion in ten years at a cost of $117,000,000.

In response to an informal suggestion by Senator Hayden that the board reconsider this ambitious plan, E. C. Bebb, the chairman, advised him that it would not be possible to do so in time to bring it up for consideration in conjunction with the Geological Survey's appropriation for the fiscal year 1937 but that it would be taken up by the board with a view to submitting a possible revision prior to the next session of Congress. Mr. Bebb pointed out that any increase in the appropriation for mapping during the next fiscal year would reduce the amount of work required in any program ultimately adopted and would meet some of the most urgent needs of map users. He informed the Arizona senator that aerial photographic methods will be utilized to the fullest practicable extent, as the board contemplated in submitting its mapping plan in 1934.

### Compulsory coordination asked

The appropriation carried by the Interior Department bill for topographic mapping was increased from $440,000, as proposed by the House, to $650,000 by action of the Senate committee. The Board of Surveys and Maps is prepared to review its 1934 proposal for a complete short-time program but it is expected that Secretary Ickes will refer the Hayden resolution to the National Resources Committee. In the meantime, the Board, which is an independent agency, is addressing a letter to President Roosevelt urging allotment of emergency funds to enable the Coast & Geodetic Survey and the Geological Survey to adjust their field control lines to the North American datum. Repeated requests by these agencies for funds for this purpose have been denied.

When the Department of Interior appropriation bill was being considered by the House Committee on Appropriations, Frederic A. Delano, vice-chairman of the National Resources Committee, proposed as a condition to the appropriation for topographic surveys that no funds be made available until the Geological Survey, the Coast & Geodetic Survey and the Lake Survey shall have prepared an agreement on the location and division of work for the national mapping program with the advice and approval of the National Resources Committee, the Board of Surveys and Maps and the Budget Bureau.

Advanced by Mr. Delano as an alternative to the proposal of the President's Science Advisory Board for consolidation of the government's principal mapping agencies, such compulsory coordination failed to impress the committee favorably and was opposed as unnecessary by Dr. W C. Mendenhall, director of the Geological Survey.

Both Mr. Delano and Dr. Mendenhall opposed the recommendation of the Science Advisory Board for consolidation of the Topographic Branch and Division of Engraving and Printing of the Geological Survey, together with the Lake Survey, in the Coast & Geodetic Survey under the name of Coast & Interior Survey. Frankly explaining that consolidation of the government's surveying and mapping activities has been a controversial question for many years, Dr. Mendenhall said that little economy could be effected as there is no overlapping at present, but argued that if any combination is to be effected, the Coast & Geodetic Survey should, as the minor activity, be transferred to the Geological Survey.

## Strike Ends on Cleveland Housing Project

A strike on one of PWA's housing projects in Cleveland has been settled and Dr. John A. Lapp, PWA's labor advisor, expressed confidence that agreement will be reached on the other two this week. The men on the Cedar Central project went back to work April 27 under an agreement providing for payment of the old rate until July 18 and the prevailing rate after that date. This was fixed by a compromise under which the old rate was given an effective term of 12 months since construction commenced, plus one month representing one-half of the time lost on account of the strike which began March 2.

Greater decentralization of PWA's inspection work on the Cleveland projects will avoid delay now resulting from reference of so many questions to Washington for decision. This does not imply any relaxation in inspection procedure considered necessary by PWA. The contractors on the Cedar Central and Outhwaite projects are George A. Fuller Co., and on the West Side project, the Madsen Co.

## Bored Caissons Planned for Connecticut River Bridge

Large steel cylinders spun to rock, 100 to 120 ft. below water level, will form the foundations for the new Connecticut River bridge to be built by the Connecticut State Highway Department at Middletown, Conn. The caissons will be sunk by the boring method by the Atwell-Montee Caisson Corp., New York, for the Merritt-Chapman & Scott Corp., New York, which has recently been awarded the contract for the substructure of the bridge. The process will be similar to that used on the foundations of the new federal building in New York City last year, described in *ENR*, July 11, 1935, p. 37. The caisson shell is a welded steel cylinder, fabricated full length, fitted with a saw-tooth cutting edge and internal jet pipes. A massive framed rig supports and rotates the cylinder, which sinks of its own weight, aided by the jetting action. The process is now in use on the last section of the West Side Elevated Highway in New York City.

The new bridge will consist of two 600-ft. tied steel arches, and long approaches of deck girder spans on both sides of the river. From end to end the bridge will be 3,420 ft. long. Bored caissons will be used for all three river piers and for certain of the approach piers. The west river pier, originally designed for two 20-ft. diameter caissons sunk 100 ft. to rock, will be carried on eight 8½-ft. bored caissons; the center pier design of two 28-ft. caissons going 110 ft. to rock has been changed to eight 11½-ft. caissons; eight 9-ft. bored caissons replace the original design of two 28-ft. caissons to be carried 120 ft. deep for the east pier.

The bridge was designed, and will be built, under the direction of John A. Macdonald, highway commissioner, J. F. Willis, engineer of bridge design, and L. G. Sumner, engineer of bridges and structures. The Merritt-Chapman & Scott contract amounts to $1,028,503. Bethlehem Steel Co. is low bidder on the superstructure, $1,085,539.

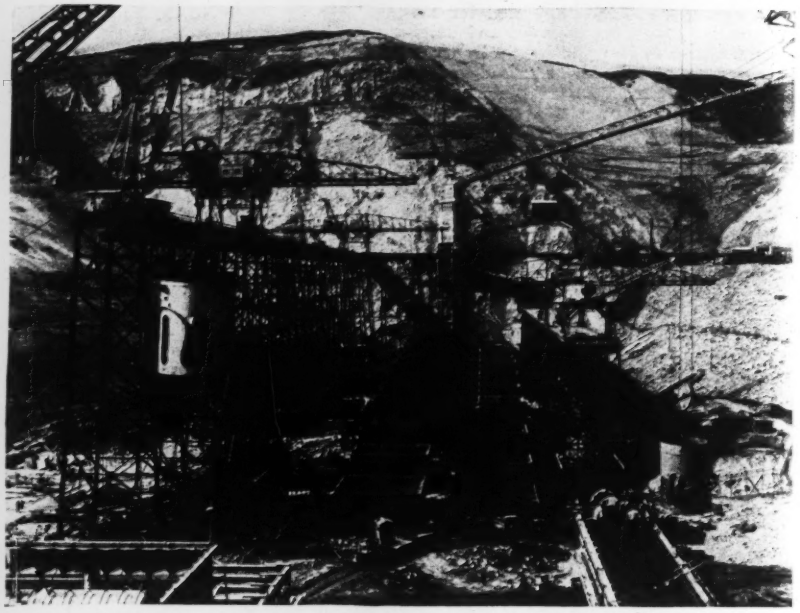
## Hetch Hetchy Power Agreement Held to Violate Raker Act

The proposed plan of the city of San Francisco for distribution of its electric power from the Hetch Hetchy hydro-electric plant does not constitute compliance with the Raker Act, which granted the use of public lands subject to restrictions in the sale of power, according to a ruling by Secretary of the Interior Ickes made on April 23. At the same time Mr. Ickes stated that an alternative plan proposed, but not formally submitted, by the city would comply with the act.

The Raker Act, passed in 1913, authorized the city to construct the Hetch Hetchy water and power plants in Yosemite National Park and Stanislaus National Forest on the condition that neither water nor power should be sold to privately-owned corporations or individuals for resale. Operation of the plant since 1922 has been carried on under agreements with the Pacific Gas & Electric Co., whereby the company purchased the power at Newark and re-sold it in San Francisco.

During the intervening years several bond issues for the construction of municipal distribution facilities have been defeated by the voters. On August 24, 1935, Secretary Ickes pointed out that the existing arrangement was in violation of the Raker Act, and on January 28, 1936, the city submitted a plan whereby it would acquire part of the Pacific Gas & Electric Co. distribution system in San Francisco and exchange power at Newark for power at the city line on a basis of 75 and 43 per cent load factors at the two points. This would give the company approximately 205,000,000 kw.-hr. annually of secondary power as compensation for transmitting the primary power from Newark to San Francisco.

The alternative plan informally advanced by city officials proposes that the city acquire all facilities necessary to transmit energy from Newark to San Francisco and to transform and distribute it to consumers. There would be no transfer of power from city ownership.



CONCRETE PLACING AT GRAND COULEE DAM

**A view inside the west cofferdam at Grand Coulee shows the high level and low level trestles used in concrete placing. Suspended in the foreground are two 4-cu.yd. buckets of the type used in placing more than 6,000 cu.yd. per day. The mixing plant, at which the suspension bridge terminates, is close to the end of the west abutment. From the cut high upon the west abutment, the cement pipeline drops down past the suspension bridge tower to the mixing plant.**

## Mosquito Control Project In New Jersey Dropped

A mosquito control project, calling for the expenditure of about $7,000,000, in Essex and Morris counties, N. J., was cancelled on April 22 because, according to the state Works Progress Administration, of the withdrawal of the mosquito commissions of the two counties as sponsors. It is reported that allocation of the funds had been approved for the work which was to be done along the Passaic River and its tributaries. Under the approved application the federal government was to have furnished $6,991,136 and the counties $10,000. It is reported that county flood control and water company officials opposed the project, holding that flood control in the valley was more important, and that mosquito control could be incorporated as part of such a project.

## Engineering Colleges Appoint New Faculty Heads

Three eastern universities—New York, Lehigh and Cornell—have recently appointed new deans to head their engineering faculties.

Thorndike Saville has been appointed dean of the college of engineering, New York University, to succeed Collins P. Bliss who will become dean emeritus. Dean Bliss has been a member of the faculty for 40 years and dean of the College of Engineering since 1930. Prof. Saville, formerly chief engineer of the North Carolina department of conservation and development, joined the faculty in 1932 as head of the department of hydraulic and sanitary engineering, and has been associate dean since May 1, 1935.

Bradley Stoughton, head of the department of metallurgical engineering at Lehigh University, has been appointed dean of the College of Engineering there. Prior to Prof. Stoughton's appointment the College of Engineering was presided over by a chairman of the council, who was elected for one year by a vote of the faculty. Prof. Stoughton was graduated in civil engineering from Yale University and in metallurgy from Massachusetts Institute of Technology. In 1932 he became head of the department of metallurgical engineering at Lehigh University.

Herman Diederichs, director of the Sibley School of Mechanical Engineering, has been elected as dean of the college of engineering at Cornell University to succeed Dexter S. Kimball, who will retire on July 1. Prof. S. C. Hollister has been made associate dean of the college of engineering in addition to his regular duties as the director of the college of civil engineering.

## New England Council Develops Flood Control Policy

A policy to bring about fuller recognition of the fact that problems of flood prevention are regional and require active cooperation between states, has been developed by the New England Council. Pointing out that the Connecticut River affects four New England states, the Merrimack two, the Blackstone two, the Saco two, and the Androscoggin two, the council holds that no one community, region or state can solve the flood problem by itself. The five point policy developed covers both reconstruction and prevention of future floods. It is the purpose of the council to develop an opinion favorable to a coordinated program of surveys of major interstate streams, and the development of a comprehensive program of flood control based upon the survey. It is also the intention of the council to develop an opinion unfavorable to the expenditure of public funds upon isolated or local projects.

## SOCIETY CALENDAR

JOINT PLANNING CONFERENCE, AMERICAN CITY PLANNING INSTITUTE, AMERICAN PLANNING AND CIVIC ASSOCIATION AND AMERICAN SOCIETY OF PLANNING OFFICIALS, Richmond, Va., May 4-6.

PUBLIC ADMINISTRATION CONFERENCE, New York University, New York, May 6-8.

AMERICAN WATER WORKS ASSOCIATION, annual meeting, Los Angeles, Calif., June 8-12.

SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION, annual meeting, Madison, Wis., June 23-26.

HIGHWAY SAFETY CONFERENCE, Ames, Iowa, June 29-July 2.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Atlantic City, N. J., June 29 to July 3.

CANADIAN GOOD ROADS ASSOCIATION, annual meeting, Charlottetown, P.E.I., September 1-3.

THIRD WORLD POWER CONFERENCE, Washington, D. C., September 7-12.

PUBLIC WORKS CONGRESS, joint meeting, AMERICAN SOCIETY OF MUNICIPAL ENGINEERS AND INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Toronto, Ont., September 28-30.

AMERICAN SOCIETY OF CIVIL ENGINEERS, regional meeting, Columbus, Ohio, May 15-16.

NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS, annual meeting, New York City, May 23.

CONCRETE REINFORCING STEEL INSTITUTE at the Hot Springs, Va., meeting, April 20-22, elected officers as follows: E. W. LANGDON, president; JAMES F. CURLEY and KENNETH D. MANN, vice-presidents. Topics covered in the papers presented were changes in the industry, marketing problems and legal aspects of the new open price plans.

## PWA Revises Terms of Bayonne Terminal Allocation

A revised contract covering the $5,252,045 PWA loan and grant for the Bayonne, New Jersey, ship-to-rail freight terminal project will be submitted to the city, PWA Administrator Ickes announced on April 25. Numerous provisions not incorporated in the first loan and grant agreement, will be included in the revised contract. The original contract had been withdrawn by PWA to permit further study of the project. The $5,252,045 loan and grant, of which $2,252,045 is a grant and $3,000,000, a loan, remains unchanged.

The new contract for the terminal (*ENR*, Dec. 19, 1935, p. 867) will embody the following conditions not incorporated in the original contract: Title to the 200 acres of land required for the project is to be indefeasibly vested in the city to protect its interest in the riparian rights which are now owned by the State, and negotiations for the sale by the state to the city are in progress. Any excess profits earned by the Central District, Inc., which is to operate the project on a lease basis after completion, shall be paid to the city of Bayonne in addition to the fixed yearly rental. This provision applies to that part of the terminal constructed with federal funds. The original plan provided for the payment of only a fixed yearly rental. The Central District corporation is to enter into a contract, satisfactory to PWA, with the Central Railroad of New Jersey covering, among other things, the railroad's commitment to purchase certain securities of the Central District.

The revised contract also calls for passage by New Jersey of legislation establishing to the satisfaction of PWA the authority of the city of Bayonne to issue at one time the entire amount of bonds necessary to secure the $3,000,000 loan on the project. None of the PWA grant is to be used for the purchase of land or riparian rights, in order that the Federal funds will be used for employment creating purposes only.

## Johnstown Completes Survey of Flood Damaged Buildings

A detailed inspection of 3,995 buildings and residences in the flood area of Johnstown, Pa., reveals that 325 structures, including 193 houses, are unfit for occupancy and will be condemned. A recheck of the damage to buildings and homes caused by the recent flood shows a loss of $6,371,185. A total of 2,925 buildings and homes were damaged, affecting 25,080 persons, more than one-third of the population of the city. Buildings and residences totally destroyed number 77, valued at $277,200. An aggregate loss of $6,115,590 was suffered by 2,644 structures damaged to the extent of more than $200 each. The inspection was made under the direction of M. M. Chudy, city assessor, and F. A. Clark, state building inspector, assisted by WPA forces, contractors and architects.

## Public Works Conference At New York

A three day conference on public administration for public works engineers will be held at New York University by the College of Engineering and the Division of Public Administration, in New York City, May 6-8. The purpose of the conference is to provide instruction in the administrative phases of public works activity and to provide a forum for the exchange of experiences and ideas on the relation of administrative practices to technical activities.

The public works finance session which will develop general principles of municipal finance will be under the direction of Prof. Paul Studenski, New York University. The application of public finance principles to practical problems will be discussed by Clifford W. Ham, executive director, American Municipal Association. Procurement practices in public works will be discussed as will be a number of other subjects related to the field of public administration.

# *Obituary*

KARL H. MARSH, for the past six years chief engineer of the Dominion Steel and Coal Corp., Sydney, N. S., died on April 22. Mr. Marsh was stricken while on his way to Montreal. A native of Corydon, Pa., Mr. Marsh was graduated from the Pennsylvania State College in 1915, and joined the Dominion Iron and Steel Co. in 1919.

HOUSTON BARNARD, president of the New York State Dredging Co., Rochester, N. Y., died in Nice, France, on April 26, at the age of 65. Mr. Barnard, who had retired a year ago, was at one time associated with the engineering work on the Hudson River tunnels.

MURRAY D. ROSALSKY, a civil engineer employed by the engineering division of the New York City Sanitation Department, died in New York City on April 23 at the age of 45. Mr. Rosalsky was graduated from Columbia University, School of Engineering, and in 1917 became an assistant engineer in the office of the borough president of Manhattan. He then served almost continually with the city until the time of his death.

RALPH L. CROW, president of the William L. Crow Construction Co., New York City, died at his home near Rye, N. Y., on April 22. Mr. Crow, who was 57 years old at the time of his death, had formerly been a member of the Westchester County Sanitary Commission. The William L. Crow Construction Co. was established in 1840.

# *Personals*

MAJOR W. A. SNOW, of the Corps of Engineers, Fort Leavenworth, Kan., has been ordered to Washington, D. C., as district engineer.

JOHN B. ALEXANDER, formerly associate hydraulic engineer in the U. S. Engineer office at Rock Island, Ill., has been transferred to the Tucumcari, N. M., engineer district, where he will have supervision of concrete dam construction.

J. PEDRERO CÓRDOVA, consulting civil engineer, Mexico City, has been appointed by the Mexican government as Commissioner of the Mexican Boundary Commission with offices in Juarez. Mr. Córdova formerly served as boundary commissioner twelve years ago.

CARL G. WAHL, of Defiance, Ohio, has been appointed state director of public works, succeeding T. S. Brindle, who died recently. The new public-works director was formally chief engineer of the division of highways.

IRA D. S. KELLY, formerly structural designer, North Dakota State Highway Department, has accepted a position on the staff of the National Lumber Manufacturers' Association and the Timber Engineering Co. He will serve as structural engineer in charge of railway and highway bridge design and construction.

VICTOR T. HOLMSTEN, formerly an engineer with the Alphons Custodis Chimney Construction Co., Chicago, and prior to that with the Continental Chimney Co. has, with ROBERT O. HUDSON, also formerly with the Custodis company, formed the Consolidated

Chimney Co. The new company will be engaged in the design and construction of chimneys.

LT.-COLONEL W. R. CRAWFORD, of the Corps of Engineers, Army War College, Washington, D. C., has been transferred to New Orleans, La., as district engineer.

FRANK T. CROWE, general superintendent of Six Companies, Inc., during construction of Boulder Dam, has been named general superintendent of the Parker Dam project on the lower Colorado River. Mr. Crowe was employed by the J. F. Shea Co., contractor for Parker Dam.

DAN A. HULICK, formerly city engineer, Greenville, S. C., is now stationed at Walterboro, S. C., as engineer inspector, PWA. During more than ten years as city engineer Mr. Hulick handled much street-widening work, paving and other improvements, including the construction of several concrete bridges, river-straightening projects and flood-control works.

JAMES S. BURCH, formerly connected with the American Road Builders Association, the Wire Reinforcement Institute, the NRA at Washington and the National Corrugated Pipe Association, has recently been appointed engineer of statistics and planning for the North Carolina State Highway and Public Works Commission, with headquarters at Raleigh.

ABRAHAM LODHOLZ, after 35 years of service in the engineering department of the Board of Transportation of New York City and its predecessors, the Public Service Commission and the Transit Commission, has retired from his position. He was closely identified with New York subway construction work and was in direct charge of several sections of the city-owned rapid transit railroad.

D. B. RUSH AND KEITH ROBERTS announce the formation of the Rush-Roberts Engineering Co. with offices and laboratories in the Field Building, Chicago, to carry on a consulting business in civil, mining and construction engineering as well as inspection and testing work. Mr. Rush was until recently manager of the engineering and mining and cement and concrete departments of Robert W. Hunt Co. Mr. Roberts, a consulting mining engineer, has had engagements in Canada, Alaska, Mexico and many places in this country.

## CONSTRUCTION STATISTICS FOR THE WEEK

ENGINEERING construction awards at $37,824,000 are higher this week due to heavier state and municipal work. This volume is made up of private awards, $10,658,000; public, $27,166,000, of which federal work totals $1,713,000 and state and municipal, $25,453,000. Corresponding values for last year are: total, $18,341,000; private, $3,627,000; public, $14,714,000; federal, $1,964,000, and state and municipal, $12,750,000.

Awards for waterworks, bridges, industrial, commercial and public buildings and highways are all higher for the week. The dollar volume for these classes of work is: industrial buildings, $3,353,000; commercial buildings, $5,195,000; public buildings, $6,607,000; highways, $10,804,000; bridges, $4,968,000; sewerage, $1,962,000; waterworks, $2,060,000; earthwork, drainage, $414,000; unclassified, $2,461,000.

The larger awards for the week include: grain elevator for Froedert Grain & Malt Co., Milwaukee, Wis., $1,350,000; lense manufacturing plant and paper manufacturing building, Eastman Kodak Co., Rochester, N. Y., $877,000; 31 two-story duplex houses for Delmar Investment, University City, Mo., $500,000; apartments for Corporation, c/o J. P. Day, New York City, at White Plains, $1,000,000; Centennial Buildings, Fort Worth, Tex., $1,176,000; additional buildings at Veterans' Hospital, Canandaigua, N. Y., $1,071,000; repairing and rebuilding township roads, Conn., $971,000; highways by Pennsylvania, $1,242,000; by Wisconsin, $828,000; by New York, $496,000; by Ohio, $485,000; by Oregon, $458,000; by Texas, $1,737,000; bridges, by Texas, $909,000; bridge and road maintenance on Washington Division, company forces, Union Pacific Ry., Washington, $1,500,000; 42- to 60-in. steel pipe for water system, Birmingham, Ala., $1,236,000; ventilation building for Midtown Tunnel, New York City, $527,000; park improvements, Rome, N. Y., $320,000.

State and municipal bond sales total $7,127,000 and several small corporate security issues for plant extensions and treasury reimbursement for additions and betterments total $2,758,000.

### CONTRACTS
(Thousands of Dollars)

| | Weekly Average Apr. 1935 | Prev. 4 Weeks | Week Apr. 30 1936 |
|---|---|---|---|
| Federal Government | $4,661 | $1,304 | $1,713 |
| State and Municipal | 13,972 | 24,843 | 25,453 |
| Total public | $18,633 | $26,147 | $27,166 |
| Total private | 10,610 | 13,261 | 10,658 |
| Week's total | $29,243 | $39,408 | $37,824 |
| Cumulative to date: | | | |
| 1935...$442,624,000 | 1936...$798,701,000 | | |

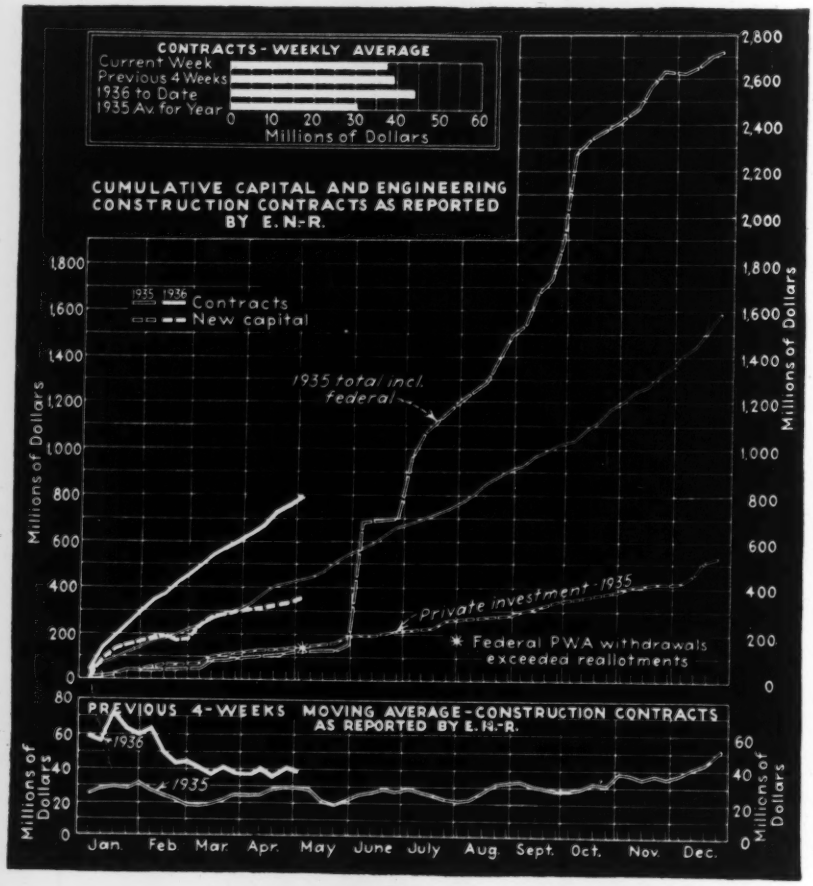
### NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

| 1936 | Week Apr. 30 | Cumulative |
|---|---|---|
| State and municipal | $7,127 | $178,081 |
| PWA non-federal | .... | 49,644 |
| RFC loans | 200 | 37,008 |
| Corporate issues | 2,758 | 82,234 |
| PWA loans, Private | .... | 1,270 |
| Total Non-Federal | $10,085 | $348,237 |
| Federal | .... | 4,955 |
| Total new capital | $10,085 | $353,192 |
| Cumulative to date: | | |
| Cumulative to date: | | |
| 1935...$120,723,000 | 1936...$353,192,000 | |

**Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for federal construction, deficiency act funds. An arbitrary percentage (25%) of the WPA allotments and local contributions to WPA work is included to allow for the capital additions through the Works Progress Administration division of the new program.**

### INDEX NUMBER

| ENR Cost | 1913 = 100 | 1926 = 100 | ENR Volume | 1913 = 100 | 1926 = 100 |
|---|---|---|---|---|---|
| **Apr., 1936** | **202.20** | **97.20** | **Mar., 1936** | **160** | **70** |
| Mar., 1936 | 201.20 | 96.71 | Feb., 1936 | 176 | 77 |
| Apr., 1935 | 194.50 | 93.49 | Mar., 1935 | 101 | 44 |
| 1935 (Av.) | 195.22 | 93.84 | 1935 (Av.) | 135 | 58 |
| 1934 (Av.) | 198.10 | 95.23 | 1934 (Av.) | 114 | 50 |
| 1933 (Av.) | 170.18 | 81.80 | 1933 (Av.) | 102 | 47 |



# Current Construction Unit Prices

## Greensburg Sanitary Sewer System

A NEW sanitary sewerage system for Greensburg, Kan., to eventually include disposal works consisting of an Imhoff tank and trickling filter, is under construction with the award of contract on Feb. 28, 1936, for the sewer work. It is anticipated that the disposal plant construction will begin in May, 1936. The project is under the jurisidiction of engineers Paulette & Wilson, Salina, Kansas, with the trenching and pipe laying scheduled for 180 days completion. PWA minimum hourly wage rates are stipulated at 85c. for skilled and 35c. for common labor. Excavation is largely loam with pockets of sand and gravel. There is no rock and normally no ground water within the limits of trenching. The following tabulation lists the unit prices and totals of the three low bidders: (A) W. B. Carter, Wichita, Kansas (contract) $57,265; (B) C. L. Burt, Hutchinson, Kan., $57,320; (C) Asplund Const. Co., Enid, Okla., $60,950.

| Item | A | B | C |
|---|---|---|---|
| 1. Trench and back fill, 0-4 ft.—865 lin.ft | $0.11 | $0.10 | $0.05 |
| 2. Trench 4-6 ft.—1,980 lin.ft | .155 | .12 | .08 |
| 2. Trench 6-8 ft.—7, 865 lin.ft | .20 | .15 | .13 |
| 4. Trench 8-10 ft.—14,915 lin.ft | .245 | .20 | .20 |
| 5. Trench 10-12 ft.—8,535 lin.ft | .285 | .25 | .25 |
| 6. Trench 12-14 ft.—6,515 lin.ft | .385 | .30 | .40 |
| 7. Trench 14-16 ft.—3,470 lin.ft | .485 | .35 | .50 |
| 8. Trench 16-18 ft.—1,795 lin.ft | .57 | .40 | .60 |
| 9. Trench 18-20 ft.—1,720 lin.ft | .66 | .50 | .75 |
| 10. Trench 20-22 ft.—710 lin.ft | 1.00 | .60 | 1.00 |
| 11. Cut, replate, bitum. mat. pav't—250 lin.ft | 1.04 | 1.00 | ..... |
| 12. Vit. clay pipe & fittings, 8 in.—26,800 lin.ft | .475 | .55 | .43 |
| 13. Vit. 10-in. v.c. pipe—8,200 lin.ft | .64 | .70 | .57 |
| 14. Vit. 12-in. v.c. pipe—9,200 lin.ft | .81 | .80 | .75 |
| 15. Vit. clay pipe risers, 6 in.—500 lin.ft | .35 | .50 | .30 |
| 16. Vit. clay wyes, 8x6 in.—1 165 each | .77 | .75 | .70 |
| 17. Vit. clay wyes, 10x6 in.—230 each | .99 | 1.00 | .95 |
| 18. Vit. clay wyes, 12x6 in.—20 each | 1.26 | 1.25 | 1.20 |
| 19. Brick manholes, 6 ft. std.—83 each | 52.80 | 60.00 | 50.00 |
| 20. Drop manholes, 6 ft.—5 each | 60.50 | 70.00 | 60.00 |
| 21. Extra manhole depth—450 lin.ft | 6.05 | 5.00 | 3.50 |
| 22. Brick flush tanks, std. 6 ft.—33 each | 90.20 | 90.00 | 80.00 |
| 23. Extra flush tank depth—70 lin.ft | 7.15 | 5.00 | 7.00 |
| 24. Galv. steel water supply, ¾ in.—5,300 lin.ft | .255 | .30 | .20 |
| 25. Water main connections, etc.—33 each | 11.00 | 7.00 | 6.00 |
| 26. C.I. pipe, 10 in.—241 lin.ft | 2.50 | 3.00 | 4.00 |
| 27. C. I. pipe, 12 in.—40 lin.ft | 3.25 | 4.00 | 4.50 |

## Hodges Reservoir Dam, San Diego

CONTRACT was awarded in March, 1936, for the strengthening of the Hodges Reservoir dam on the San Dieguito River, as a further step in San Diego's water conservation and development program under the supervision of hydraulic engineer Fred D. Pyle. The project is financed through PWA funds and is located approximately 10 miles east of Solana Beach and 7 miles southwest of Escondido, Cal. Eight bids received ranged from the contract low of $130,613 to a high of $179,621. The following tabulation lists the unit prices and totals of the three low bidders: (A) M. H. Golden, San Diego, Cal. (contract) $130,613; (B) B. O. Larsen, San Diego, $140,231; (C) Case Const. Co., Alhambra, Cal., $156,810.

| Item | A | B | C |
|---|---|---|---|
| 1. Excav. Cl. 1—300 cu.yd | $5.35 | $6.00 | $3.00 |
| 2. Excav. Cl. 2—50 cu.yd | 5.35 | 4.00 | 7.00 |
| 3. Excav. spillway cutoff—100 cu.yd | 4.00 | 6.00 | 4.00 |
| 4. Excav. Cl. 4, spillway—200 cu.yd | 3.80 | 5.00 | 2.50 |
| 5. Concrete, Cl. 1, cols., struts—2,500 cu.yd | 18.20 | 20.00 | 24.40 |
| 6. Concrete, Cl. 2, diagonals—950 cu.yd | 21.20 | 20.00 | 26.40 |
| 7. Concrete, Cl. 3, footings—150 cu.yd | 13.00 | 15.00 | 7.15 |
| 8. Concrete, Cl. 4, spillway—600 cu.yd | 7.30 | 16.00 | 6.70 |
| 9. Cement in work—6,500 bbl | 2.86 | 2.60 | 2.60 |
| 10. Place, clean reinf. steel—80,000 lb | .015 | .02 | .028 |
| 11. Reinf. steel furnished by contractor—550,000 lb | .04 | .045 | .046 |
| 12. Steel tie bars—55,000 lb | .07 | .10 | .11 |
| 13. Steel plates—40,600 lb | .05 | .06 | .06 |
| 14. Drill holes in concrete—1,700 lin.ft | .90 | .20 | 2.50 |
| 15. Chip concrete surfaces—9,300 sq.ft | .25 | .10 | .18 |
| 16. Chip keyways—1,650 cu.ft | 1.70 | 1.00 | .75 |
| 17. Grouting—575 holes | .60 | 1.00 | 2.00 |
| 18. Anchor holes, 1¼-in. spillway—500 ft | .55 | .20 | .50 |
| 19. Anchor holes, 2½-in. plus—1,000 ft | .66 | 1.00 | 2.00 |

## San Diego Welded Pipeline

THE El Capitan-Lakeside pipeline, financed through PWA funds, is now under construction with the award of contract in February 1936 to Consolidated Steel Corp., Los Angeles, for 4 miles of 48-in. and 2 miles of 36-in. electrically-welded pipeline, with protective coating of coal tar enamel. The present work, involving only that portion of the pipeline for which the city of San Diego is responsible, is under the jurisdiction of Fred D. Pyle.

The following tabulation lists the unit prices and totals of the three lowest bidders: (A) Consolidated Steel Corp., Ltd., Los Angeles, Cal. (contract) $412,360; (B) Western Pipe & Steel Co., $424,848; (C) Southwest Welding & Mfg. Co., Inc., $432,062.

| Item | A | B | C |
|---|---|---|---|
| 1. Excav. Cl. 1—30,850 cu.yd | $0.84 | $0.66 | $0.79 |
| 2. Excav. Sta. 313—11,800 cu.yd | .572 | .55 | .61 |
| 3. Excav. Cl. 2—12,500 cu.yd | .705 | .68 | .79 |
| 4. Haul excav. up to 400 ft.—11,500 cu.yd | .143 | .14 | .14 |
| 5. Haul excav. beyond 400 ft.—1,000 cu.yd | .385 | .37 | .39 |
| 6. Back fill, Sta. 104—29,300 cu.yd | .50 | .45 | .53 |
| 7. Steel plate pipe, ¼x48 in.—2,236 lin.ft | 8.95 | 10.40 | 9.97 |
| 8. Steel plate pipe, 5/16x48 in.—10,000 lin.ft | 10.10 | 11.20 | 10.85 |
| 9. Steel plate pipe, 3/8x48 in.—7,500 lin.ft | 10.95 | 12.05 | 11.36 |
| 10. Steel plate pipe, 5/8x48 in.—1,200 lin.ft | 12.70 | 13.70 | 13.59 |
| 11. Steel plate reducers, 48x36x 5/16 in.—2 each | 167.50 | 234.00 | 200.00 |
| 12. Steel plate reducers, 36x30x 5/16 in.—3 each | 177.00 | 178.00 | 200.00 |
| 13. Steel plate reducers, 36x20x 5/16 in.—1 each | 209.00 | 152.00 | 202.00 |
| 14. Circular seams, 48 in.—90 each | 50.00 | 10.00 | 44.00 |
| 15. Steel plate pipe, 36x ¼ in.—8,300 lin.ft | 7.40 | 7.95 | 7.23 |
| 16. Steel plate pipe, 36x 5/16 in.—1,817 lin.ft | 8.20 | 8.60 | 8.79 |
| 17. Circum. seams, 36x 5/16 in.—1,350 lin.ft | 9.06 | 9.25 | 9.12 |
| 18. Steel plate pipe, 28x ¼ in.—75 lin.ft | 6.90 | 7.95 | 7.50 |
| 19. Steel reducer, 30x28x 5/16 in.—1 each | 177.20 | 167.00 | 175.00 |
| 20. Steel reducer, 36x28x 5/16 in.—1 each | 158.23 | 177.00 | 160.00 |
| 21. Steel reducer, 36x16x 5/16 in.—2 each | 115.00 | 142.00 | 114.50 |
| 22. Circular seams, 36 in.—50 each | 40.00 | 8.75 | 39.92 |
| 23. Special sections, complete—3,000 lb | .209 | .15 | .2133 |
| 24. Steel pipe fabricated angles—20,000 lb | .189 | .12 | .1975 |
| 25. Dresser couplings, 48 in.—3 each | 91.50 | 104.00 | 94.00 |
| 26. Dresser couplings, 36 in.—3 each | 73.34 | 81.00 | 77.33 |
| 27. Gate valves, 30 in. bevel geared—1 each | 1.415 | 1.322 | 1.560 |
| 28. Gate valves, 36 in. bevel geared—1 each | 2.125 | 2.010 | 2.862 |
| 29. Gate valves, 20 in. bevel geared—1 each | 655.00 | 594.00 | 643.00 |
| 30. Gate valves, 30 in. bevel geared—1 each | 1.415 | 1.320 | 1.490 |
| 31. Air and vac. assemblies, 4 in.—1 each | 210.00 | 138.00 | 243.00 |
| 32. Comp. pressure air valve, 4 in.—15 each | 210.00 | 211.00 | 246.70 |
| 33. Pressure air valves, 2 in.—1 each | 90.00 | 91.00 | 96.00 |
| 34. Blowoff assemblies, 4 in.—6 each | 42.50 | 43.00 | 50.33 |
| 35. Blowoff assemblies, 6 in.—4 each | 60.00 | 63.00 | 65.50 |
| 36. Std. W.I. pipe, 2 in.—20 lin.ft | 1.00 | .69 | 1.40 |
| 37. Std. W. I. pipe, 4 in.—575 lin.ft | 1.50 | 1.57 | 1.47 |
| 38. Std. W.I. pipe, 6 in.—250 lin.ft | 2.50 | 2.63 | 2.45 |
| 39. Dipped steel pipe, 12 ga. 12 in.—80 lin.ft | 1.625 | 1.45 | 1.58 |
| 40. Dipped steel pipe, 8 ga. 20 in.—235 lin.ft | 2.42 | 2.80 | 2.48 |
| 41. Misc. C.I. frames and covers—3,500 lb | .077 | .08 | .98 |
| 42. Remove bulkhead—1 each | 150.00 | 100.00 | 35.00 |
| 43. Struct. excavation, Cl. 3—225 cu.yd | 2.20 | 2.11 | 2.20 |
| 44. Struct. excavation, Cl. 4—220 cu.yd | 2.20 | 2.11 | 2.18 |
| 45. Concrete, Cl. 1, exc. steel, cement—115 cu.yd | 20.00 | 19.50 | 22.60 |
| 46. Concrete, Cl. 2, exc. steel, cement—40 cu.yd | 20.00 | 19.50 | 22.05 |
| 47. Cement in place—260 bbl | 2.75 | 2.55 | 2.60 |
| 48. Struct. steel rim angles—1,000 lb | .10 | .12 | .1725 |
| 49. Reinf. steel—17,000 lb | .06 | .06 | .0608 |
| 50. Concrete drain pipe, 6 in.—175 lin.ft | 2.50 | .43 | .446 |
| 51. Struct. steel covers—200 lb | .30 | .28 | .55 |
| 52. Man holes—3 each | 85.00 | 107.00 | 82.00 |
| 53. Drill holes in concrete—25 ft | 2.00 | 1.60 | 1.84 |
| 54. Misc. concrete—200 cu.ft | 1.65 | 1.60 | 1.68 |
| 55. Pressure reducer, 16 in.—1 each | 3.500 | 3.326 | 4.200 |
| 56. Recording station for meter—1 each | 200.00 | 169.00 | 178.00 |
| 57. Venturi meter, 350 ft. head, 28 in.—1 each | 3.000 | 2.625 | 3.400 |
| 58. Corporation cock connection, 1 in.—1 each | 25.00 | 5.00 | 29.00 |
| 59. Creosoted timber piles—3,500 lin.ft | 2.00 | 1.69 | 1.93 |
| 60. Timber pile pipe supports—1 M B.M | 175.00 | 158.00 | 168.00 |
| 61. Misc. timber—1 M.B.M | 175.00 | 158.00 | 168.00 |
| 62. Concrete pavement, remove, replace—200 cu.ft. | 2.00 | 1.06 | 1.10 |
| 63. Pressure taps ¾ in., Bronze valves—2 each | 7.50 | 10.00 | 8.00 |

## Iowa Highway Construction

CONSTRUCTION of 7.961 miles of 20-ft. concrete pavement, 17 concrete pipe and 33 box culverts, and one 150x24-ft. continuous I-beam bridge, involving two separate contracts awarded in March, 1936, is in progress in Scott County, Iowa, under the jurisdiction of state highway engineer F. R. White. The two projects combined will complete a relocation of U. S. Route No. 6 through the north part of Davenport, connecting with the new suspension

bridge over the Mississippi River. The following tabulation lists the unit bids and totals of the three low bidders on each of the two subdivisions. **Paving:** sections CD and EF (respective bids) (A) McKenzie & Holm, Inc., Waterloo, Iowa, combined with Burch Construction Co., Cedar Rapids, Iowa (contract) $85,122 and $170,166; (B) Central Engineering Co., Davenport, Iowa, $89,938 and $180,201; (C) Koss Construction Co., Des Moines, Iowa, $92,542 and $184,010. Culverts and bridges, section CD, and culverts, section EF (respective bids) (D) Christie & Mills, Omaha, Neb. (contract) $13,604, $7,781 and $15,674; (E) C. W. Boltz, Indianola, Iowa, $14,558, $8,768.02 and no bid for section EF; (F) S. C. Anderson, Des Moines, Iowa, $14,696, $8,082 and $16,745.

STATE HIGHWAY, SCOTT COUNTY, IOWA

| Item | SEC. CD—2.973 Mi. Pavement | A | B | C |
|---|---|---|---|---|
| 1. | Excav. roadway & borrow—93,000 cu.yd. | $0.18 | $0.165 | $0.25 |
| 2. | Excav. channel—1,628 cu.yd. | .18 | .25 | .25 |
| 3. | Concrete pavement—35,121.7 sq.yd. | 1.82 | 1.98 | 1.83 |
| 4. | Flumes, type A—18 each | 62.00 | 70.00 | 67.00 |
| 5. | Flumes, type B—11 each | 62.00 | 70.00 | 67.00 |
| 6. | Corr. metal pipe, 15 in.—220 lin.ft. | .98 | 1.05 | 1.10 |
| 7. | Corr. metal pipe, 18 in.—140 lin.ft. | 1.10 | 1.30 | 1.35 |
| 8. | Corr. metal pipe, 24 in.—80 lin.ft. | 1.60 | 2.00 | 2.00 |
| 9. | Corr. metal pipe, 30 in.—20 lin.ft. | 2.25 | 2.50 | 2.50 |
| 10. | Remove old pavement—481.4 sq.yd. | .25 | .35 | .30 |
| 11. | Mud jack old pavement—40 cu.yd. | 4.00 | 6.50 | 8.00 |
| 12. | Finish earth shoulders—15,644.4 lin.ft. | .10 | .10 | .10 |
| | **SEC. EF—4.988 Mi. Pavement** | | | |
| 1. | Excav. roadway & borrow—166,306 cu.yd. | .18 | .165 | .25 |
| 2. | Excav. channel—2,818 cu.yd. | .18 | .25 | .25 |
| 3. | Excav. approach—2,750 cu.yd. | .18 | .20 | .25 |
| 4. | Concrete pavement—69,451.2 sq.yd. | 1.82 | 1.98 | 1.83 |
| 5. | Remove old pavement—7,484 sq.yd. | .25 | .35 | .20 |
| 6. | Concrete masonry—11 cu.yd. | 20.00 | 16.00 | 10.00 |
| 7. | Flumes, type A—40 each | 62.00 | 70.00 | 67.00 |
| 8. | Flumes, type B—13 each | 62.00 | 70.00 | 67.00 |
| 9. | Tile intakes—2 each | 60.00 | 40.00 | 50.00 |
| 10. | Manholes—3 each | 125.00 | 75.00 | 100.00 |
| 11. | Concrete sidewalk—4,100 sq.ft. | .20 | .25 | .20 |
| 12. | Storm sewer, 12 in.—580 lin.ft. | .70 | 1.30 | 1.00 |
| 13. | Single paving intakes—12 each | 75.00 | 40.00 | 75.00 |
| 14. | Triple paving intakes—1 each | 150.00 | 40.00 | 200.00 |
| 15. | Corr. metal pipe, 15 in.—380 lin.ft. | .90 | 1.05 | 1.10 |
| 16. | Corr. metal pipe, 18 in.—220 lin.ft. | 1.10 | 1.30 | 1.35 |
| 17. | Corr. metal pipe, 24 in.—220 lin.ft. | 1.60 | 2.00 | 2.00 |
| 18. | Corr. metal pipe, 30 in.—60 lin.ft. | 2.25 | 2.50 | 2.50 |
| 19. | Mud jack old pavement—150 cu.yd. | 6.50 | 6.50 | 8.00 |
| 20. | Finish earth shoulders—26,341 lin.ft. | .10 | .10 | .10 |
| | **SEC. CD—5 concrete pipe and 15 box culverts** | D | E | F |
| 1. | Reinf. concrete pipe, 24 in.—288 lin.ft. | 2.25 | 2.50 | 2.15 |
| 2. | Concrete masonry—665.6 cu.yd. | 15.60 | 16.00 | 17.00 |
| 3. | Reinforcing steel—57,742 lb. | .03 | .04 | .035 |
| 4. | Excav. Cl. I—584 cu.yd. | .75 | 1.10 | .70 |
| 5. | Fill—705 cu.yd. | .50 | .30 | .40 |
| 6. | Remove old structure—total | 50.00 | 25.00 | 50.00 |
| | **150x24 ft. I-beam bridge** | | | |
| 1. | Concrete masonry—193.4 cu.yd. | 15.60 | 19.00 | 17.00 |
| 2. | Reinforcing steel—19,578 lb. | .04 | .04 | .035 |
| 3. | Structural steel—40,900 lb. | .05 | .047 | .0525 |
| 4. | Untreated piling—1,480 lin.ft. | .70 | .80 | .70 |
| 5. | Excav. Cl. I—100 cu.yd. | 1.00 | 1.00 | .70 |
| 6. | Excav. Cl. II—180 cu.yd. | 3.50 | 5.00 | 4.00 |
| 7. | Excav., channel—340 cu.yd. | .50 | .60 | .40 |
| | **SEC. EF—18 concrete pipe and 12 box culverts** | | | |
| 1. | Corr. metal pipe, 24 in.—32 lin.ft. | 1.75 | ..... | 2.00 |
| 2. | Reinf. concrete pipe, 24 in.—600 lin.ft. | 2.25 | ..... | 2.10 |
| 3. | Reinf. concrete pipe, 30 in.—18 lin.ft. | 3.50 | ..... | 3.10 |
| 4. | Concrete masonry—737.8 cu.yd. | 15.60 | ..... | 17.00 |
| 5. | Reinforcing steel—67,080 lb. | .03 | ..... | .035 |
| 6. | Excav., Cl. I—141 cu.yd. | .75 | ..... | .70 |
| 7. | Fill—1,005 cu.yd. | .50 | ..... | .30 |
| 8. | Remove old structures—total | 75.00 | ..... | 75.00 |

## Neches River Bridge, Port Arthur

SUBSTRUCTURE work was started March 3, 1936 on the new 7,815-ft. Neches River bridge located 6 miles northeast of Port Arthur, Texas, which is to serve highway traffic between Port Arthur and Orange, along the Texas coast, and ultimately to form a link in an alternate route for the old Spanish Trail between New Orleans and Houston. As described in *ENR*, March 19, 1936, the foundations of the central spans will consist of eight piers composed of two caissons each, averaging in depth from 90 to 102 ft. below sea level. The approach spans are provided with inclined piles with carefully determined batters to provide for transverse loads. Bids for the superstructure are expected to be opened in May 1936, with completion scheduled for January, 1938. PWA minimum hourly wage rates are stipulated of 80c. for skilled and 40c. for common labor. G. G. Wickline is engineer in charge of the project, plans and specifications being prepared by Ash, Howard, Needles & Tammen, consulting engineers of New York and Kansas City. The following tabulations list the unit prices and totals of the three low bidders. (A) Union Bridge & Construction Co., Kansas City, Mo. (contract) $828,740; (B) Missouri Valley Bridge Co., $883,560; (C) Brown & Root $974,931.

| Item | A | B | C |
|---|---|---|---|
| 1. Concrete, caisson piers—22,200 cu.yd. | $19.70 | $22.50 | $26.70 |
| 2. Caisson pier shafts—3,420 cu.yd. | 21.00 | 21.00 | 20.76 |
| 3. Concrete pedestals, abutments—6,700 cu.yd. | 27.60 | 21.00 | 22.00 |
| 4. Foundation timber piling, untreated—102,800 lin.ft. | .61 | .85 | .78 |
| 5. Foundation steel piling—2,000 lin.ft. | 2.00 | 2.00 | 2.50 |
| 6. Reinforcing steel—670,000 lb. | .045 | .05 | .0434 |
| 7. Anchor bolts, misc.—65,000 lb. | .10 | .06 | .109 |
| 8. Creosoted timber piling, fenders—19,200 lin.ft. | 1.28 | 2.00 | 1.84 |
| 9. Creosoted timber, fenders—38 M.B.M. | 177.00 | 250.00 | 169.00 |

## Galveston Causeway

CONSTRUCTION of a four-lane two-mile causeway with draw spans and approaches carrying Highways 38 and 146 across Galveston Bay at Galveston, Texas, is expected to start in April, 1936, with recent award of contract to the Austin Bridge Company for the complete operation. The bridge proper totals 8,194 ft. of the overall 11,274 ft. length, with double-leaf bascule spans of 105-ft. clear, supported by caissons 9 to 10 ft. in diameter. The project, under the supervision of The Terrell Bartlett Engineers, San Antonio, Texas, is scheduled for completion 600 days after the work order is issued, with PWA minimum hourly wage rates prevailing of $1 for skilled and 40c. for common labor. The following tabulations list the unit bids and totals of the low bidders on each sub-division of the total contract.

| | Substructure I | Superstructure II | Approaches III |
|---|---|---|---|
| A—Hardaway Contracting Co. | $664,559 | $845,405 | ..... |
| B—Austin Bridge Co. | 718,502 | 737,716 | 179,700 |
| C—J. Dupuy | 809,472 | 891,464 | ..... |
| D—Jacobsen Sweeney | ..... | ..... | 241,445 |
| E—Missouri Valley Bridge Co. | 887,770 | 752,845 | ..... |

| Item | Description | A | B | C |
|---|---|---|---|---|
| | **I—Substructure—Contract A** | | | |
| 1. | Caisson excav., subwater—11,500 cu.yd. | $1.00 | $2.50 | $3.50 |
| 2. | Struct. excav., subwater—2,000 cu.yd. | 1.00 | 2.50 | 3.50 |
| 3. | Struct. excav., above water—100 cu.yd. | 1.00 | 2.50 | 1.00 |
| 4. | Caisson shells, in place—5,000 vert.ft. | 15.00 | 28.00 | 19.75 |
| 5. | Caisson shells, extra depth—300 vert.ft. | 20.00 | 45.00 | 25.00 |
| 6. | Cofferdams, bascule piers—380 Hor.ft. | 30.00 | 35.00 | 148.50 |
| 7. | Creosoted Wakefield piles, 9 in.—13,200 lin.ft. | 1.50 | 1.40 | 1.00 |
| 8. | Wakefield piles, 6 in.—630 Hor.ft. | 7.00 | 17.00 | 7.00 |
| 9. | Timber piles, untreated—160,000 lin.ft. | .30 | .56 | .55 |
| 10. | Creosoted piles, No. 26 treat.—3,600 lin.ft. | 1.00 | 1.13 | 1.00 |
| 11. | Creosoted piles, No. 12 treat.—12 M.B.M. | 125.00 | 121.00 | 100.00 |
| 12. | Galv. belts, spikes, chains—2,000 lb. | .25 | .20 | .20 |
| 13. | Concrete, lower caissons—6,800 cu.yd. | 18.70 | 15.20 | 19.76 |
| 14. | Concrete, wall fastenings—810 cu.yd. | 18.70 | 15.20 | 21.36 |
| 15. | Bascule pier concrete—3,000 cu.yd. | 18.70 | 15.20 | 18.36 |
| 16. | Concrete, Cl. B—1,700 cu.yd. | 18.70 | 15.20 | 20.36 |
| 17. | Concrete, top caissons—7,120 cu.yd. | 19.25 | 16.00 | 20.00 |
| 18. | Concrete, pier caps—2,610 cu.yd. | 19.25 | 16.00 | 20.64 |
| 19. | Reinforcing steel—1,255,000 lb. | .05 | .04 | .04 |
| 20. | Lead bearing plates—10,000 lb. | .20 | .12 | .20 |
| | **II—Superstructure—Girder Spans—Contract B** | | | |
| 21. | Concrete, girders and slabs—24,400 cu.yd. | 18.00 | 17.10 | 18.75 |
| 22. | Concrete, walls, posts—50 cu.yd. | 19.00 | 20.00 | 18.75 |
| 23. | Reinforcing steel, straight—1,260,000 lb. | .04 | .045 | .045 |
| 24. | Reinforcing steel, bent—4,700,000 lb. | .04 | .0475 | .055 |
| 25. | Steel, rolled, beams, cols.—105,000 lb. | .043 | .05 | .05 |
| 26. | Concrete railing—16,210 lin.ft. | 3.00 | 2.50 | 3.00 |
| 27. | Steel floor plates, 41 each | 73.00 | 60.00 | 50.00 |
| 28. | Deck drain scuppers—320 each | 2.40 | 6.00 | 2.50 |
| 29. | Wiring, lighting posts—250 each | 6.00 | 12.00 | 6.00 |
| 30. | Misc. concrete, Cl. B—50 cu.yd. | 15.20 | 20.00 | 18.75 |
| | **III—Approaches—Contract D** | B | D | ..... |
| 31. | Dredged embankment—275,000 cu.yd. | .20 | .298 | ..... |
| 32. | Embankment overhaul—80,000 M. ft. cu.yd. | .04 | .50 | ..... |
| 33. | Wakefield piles, 3 in.—27,000 lin.ft. | .15 | .25 | ..... |
| 34. | Riprap, 250-1,000 lb.—7,000 ton | 4.80 | 5.45 | ..... |
| 35. | Riprap filling—1,500 ton | 4.40 | 5.45 | ..... |
| 36. | Slope paving dry—16,200 sq.yd. | 3.10 | 4.26 | ..... |
| 36A. | Slope pavement, 10 in. conc., gravel—16,200 sq.yd. | 3.00 | 2.10 | ..... |
| 37. | Sodded top soil—30,000 sq.yd. | .22 | .43 | ..... |
| 38. | Temp. asphalt shell pavement—25,000 sq.yd. | .57 | .48 | ..... |
| 39. | Guard fence, approaches—6,000 lin.ft. | .55 | .80 | ..... |
| 40. | Dredge and waste—30,000 cu.yd. | .15 | .09 | ..... |

# CONSTRUCTION REPORTS

## WATERWORKS

### PROPOSED WORK

**Calif., Woodlake** — Woodlake Utility Dist., voted bonds Apr. 14, to finance construction of new water system to replace service of privately owned water system. $32,000. L. H. Gadsby, 714 North Willis St., Visalia, engr. Noted Mar. 19, C.D.—Mar. 26, E. N.-R.

**Conn., Westport**—Bridgeport Hydraulic Co., 833 Main St., Bridgeport, plans new 7 m.g.c. reservoir and dam, Saugatuck River Valley. D. H. Hall, 833 Main St., Bridgeport. Private plans.

**Ill., Paris**—Bd. Local Impvts., L. McCord, clk., soon takes bids constructing waterworks system and sewage disposal plant, gasoline and electrical pumping equipment, storage tank, distribution system, filter improvements, sewage disposal system. $250,000. Warren & Praag, Decatur, engrs.

**Kan., Eudora**—City, election May 4, to vote bonds for waterworks plant, $54,000. Shockley Eng. Co., 800 Graphic Arts Bldg., Kansas City, Mo., engrs. Noted Sept. 16, C. D.—Sept. 19, E. N.-R.

★ **Massachusetts** — Commonwealth of Massachusetts, Metropolitan Dist. Comn., Water Supply Div., W. E. Whittaker, secy., 20 Somerset St., Boston, making plans constructing earthern baffle to divert flow of East Branch of Swift River from mouth of tunnel in connection with Swift River Water Supply Project, Greenwich. $800,000.

**Mass., Boston**—Commonwealth of Massachusetts, Metropolitan Dist. Comn., Water Div., W. E. Foss, dir., 20 Somerset St., Boston, making plans concrete and brick pumping station, Alexander Ave., Belmont.

**Mass., Fitchburg**—City, J. Pierce, chn. Bd. P. Wks., City Hall, plans rebuilding 74 ft. span steel truss bridge, Sheldon St., $10,000; two 40 ft. span steel girder bridge, River St., $40,000; two 22 ft. span granite arches, Cushing St., $10,000, damaged by flood.

**Mass., Lawrence**—City, W. A. Griffin, mayor, City Hall, is not having surveys made and does not plan construction of filter plant, incl. new filtration bed with new intakes, mixing chambers, equipped with mechanical agitators, covered coagulating basin, six 1,350,000 gpdc rapid sand filters, designed to operate at a rate of 1,250,000 gals. per acre per day; clear well, filtered water conduit, washing tank of 100,000 gals. capacity. P. S. Nugent, supt. Water Dpt. (**Correction**—Status). Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**Mass., Waltham**—City, H. F. Beal, supt. P. Wks., City Hall, plans 600,000 gal. steel standpipe. **Maturity indefinite.**

**Minn., Albert Lea**—City, R. L. Van Nocker, mgr., plans furnishing, installing 5,526 lin.ft. 6 in. c.i. water mains, 12 hydrants, etc.

**Mont., Billings**—City voted $25,000 for constructing 1 mi. c.i. watermains and 1 water tank at municipal airport. R. T. Hurdle, city engr. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

**N. J., Sayreville**—T. Thompson, mayor and Council, plan purchasing 5,000 ft. 6 in. watermain to be laid from Rose's Corner to South Amboy Line on Brodentown Ave.

**N. Y., Newburgh**—City plans replacing 6- to 12-in. c.i. mains, fire hydrants, hose connections, appurtenances, etc., watermains from Little Britain Rd. to City Home; constructing watermains in Montgomery St. from Broad to Water Sts.; Montgomery St. from 1st to 3rd Sts., and from 3rd to South Sts.; 4th St. from Smith to Montgomery Sts.; 5th St. from Front to Montgomery Sts.; Nicoll St. from Liberty to Water Sts. $39,000. May build by own forces. C. R. Woodhull, city engr.

**N. Y., Syracuse**—City made plans and takes bids probably in May constructing addition to reservoir of city supply system. $27,000. F. M. Gurney, city engr.

**Pa., Reynoldsville** — Borough plans 1 m.g. rein.-con. reservoir, 300 ft. earth dam, 25 ft. high, concrete spillway. $45,000. R. H. Craig, 222 North 3rd St., Harrisburg, consult. engr. Will ask W.P.A. aid.

**Tenn., Alma**—Municipality plans 100,000 gal. water storage tank and tower.

**Wash., Elma**—Town plans extending water system from Wenzill Springs to Satsop, $12,112. E. G. Hunt, Aberdeen, engr. Noted Jan. 22, C.D.

**Que., Ile Maligne** — Municipality, supplying, laying 8 in. c.i. main, constructing 100,000 gal. elevated tank, 8 and 10 in. vitr. sewer pipe, $30,000. F. L. Lawton, Arvida, engr.

### BIDS ASKED

†**Calif., San Francisco** — Superintendent of Construction, Veterans Administration Hospital, Palo Alto, taking bids drilling test well on reservation of Veterans Administration Facility, Fort Miley.

**Calif., San Francisco**—May 13, by State Hy. Comn., Sacramento, water system, planting various types of tree and shrubs, grading, planting lawn etc., at 5th St. Plaza in connection with San Francisco-Oakland Bay Bridge, involving 460 ft. 1½ in. 635 ft. 1 in., and 650 ft. ¾ in. galvanized iron pipe, sprinklers, heads, etc. C. H. Purcell, 500 Sansome St., ch. hy. engr.

**Colo., Colorado Springs**—City bids about May 15, constructing Cathamount Damon Crystal Creek, elevation 9,100 ft. F. O. Ray, city engr. Noted Mar. 7, 1925, C. D.—Mar. 14, E. N.-R.

**Ind., Carthage**—May 11, by Town Bd., J. A. Lineback, clk., constructing pumping station, elevated storage tank, distribution system, Div. B; and pumping equipment, control equipment and switchboard, Div. C. $40,000. P.W.A. project. Lennox & Mathews, 537 Architects & Builders Bldg., Indianapolis, engrs. Noted Nov. 29, C. D.

**Minn., Bronson**—See "Contracts Awarded."

**N. J., Point Pleasant**—May 5, by J. D. Humphries, boro engr., 22,000 lin.ft. 4- to 12-in. watermains and appurtenances. J. F. Sherman, boro clk.; adv. E. N.-R. Apr. 30.

**N. J., Trenton**—May 13, by Institutions & Agencies, State Bldg., 700 gal. centrifugal pump, water tank, piping, at New Jersey State Hospital, $1,800. C. N. Leathem, State Bldg., engr.

**N. Y., Rochester**—See "Contracts Awarded."

**R. I., Providence**—See "Contracts Awarded."

**Man., Winnipeg**—May 13, by Chairman Administration Bd. Greater Winnipeg Dist., G. F. Bentley, clk., City Hall, furnishing, installing, constructing vacuum filter equipment and accessories. Noted Sept. 19, 1934, C. D.—Sept. 27, 1934, E. N.-R.

### CONTRACTS AWARDED

★ **Ala., Birmingham**—City, 42- to 60-in. steel pipe for water system, to Ingalls Iron Wks. Co., 720 4th Ave. S., and Chicago Bridge & Iron Wks., 1500 North 50th St., $1,236,000. **P.W.A.** Bids **Apr. 10.** Noted Apr. 16, C.D.—Apr. 23, E.N.-R.

**Calif., San Francisco**—Public Utilities Comn., City Hall, Water Dpt., Spec. 110, involving excavation and embankment for Sunset Reservoir, 90 m.g.c., etc., in area bounded by Ortega and Quintara Sts., 24th and 28th Aves., for City and San Francisco Co., to Piombo Bros. & Co., 1571 Turk St., $238,121. **P.W.A.** Bids Apr. 15, awarded Apr. 22. Noted Apr. 22, C. D.

**Calif., Santa Barbara**—City Council, furnishing 4,500 bbl. modified Portland cement for filtration plant and 8,000 bbl. for Sheffield Dam and Reservoir, to Riverside Cement Co., 621 South Hope St., Los Angeles, $33,350. Est. approximately $30,000. Bids Apr. 9, awarded Apr. 16.

**Ga., Darien**—City, addition to waterworks, to Hornbuckle & Cole, Atlanta, $11,922. Est. $15,636. **P.W.A.** W. A. Philips, Darien, Engr.

**Kan., Galva**—City, constructing waterworks and distribution system, incl. wells, pumps, distribution mains, tank on tower, to W. B. Carter, Wichita, $26,923. **P.W.A.** Bids Dec. 11. Hefling & Hughes, 20½ West 2nd St., Hutchinson, engrs.

**Md., Baltimore**—Baltimore Co., furnishing, laying water mains and appurtenances in various sections of county, to Morroco Constr. Co., 231 South Exeter St. $44,396. Est. $50,000. S. A. Green, Towson, engr. Noted Jan. 21, C. D.—Jan. 23, E. N.-R.

**Mass., Amesbury**—Town, Bd. Water Comrs., Town Hall, furnishing, installing two 12 in. electrically operated gate valves, 3,000 ft. conductor cable and control stations, to Kenworthy & Taylor, 11 Spaulding St., Everett, $3,719. Bids Apr. 10, awarded Apr. 21. **P.W.A.** Noted Apr. 20, C. D.—Mar. 12, E. N.-R.

**Minn., Bronson**—State Conservation Comn., E. V. Willard, dir. State Office Bldg., St. Paul, constructing dam in Two Rivers east of here making 3 mi. lake to provide water supply for Bronson and Hallock, relief labor. $180,000. **W.P.A.** P. R. Johnson, 1209 New York Bldg., St. Paul, procurement officer, W.P.A.

**Minn., Rochester**—State, C. R. Erickson, state comr. Purchases, State Capitol Bldg., St. Paul, drilling deep well at State Asylum, to McCarthy Well Co., 670 Eustis St., St. Paul, $2,467. Bids Apr. 2. Noted Apr. 14, C. D.—Mar. 26, E. N.-R.

**Mont., Billings**—Yellowstone Co., G. G. Olson, clk., furnishing, laying 2,220 lin.ft. c.i. watermain, valves, specials, in Special Impvt. Dist. 27, to Barry O'Leary, Billings, $2,517. Bids Apr. 9.

**N. Y., Red Hook**—Village, laying pipe, building pumping station, etc. Contr. C, to White & Scutiere, 21 South Lawn Ave., Elmsford. Total est. $63,892. **P.W.A.** Bids Apr. 9. Noted Apr. 3, C. D.

**N. Y., Rochester**—Bd. Supervs. Monroe Co., constructing water service connections in Winton Rd. from Rochester city line northerly to Empire Blvd. in Irondequoit, relief labor. $39,000. **W.P.A.** A. Hackett, 1460 South Ave., Rochester, procurement Officer, W.P.A., will purchase materials.

**N. C., Mooresville**—Burlington Mills, filter plant at Burlington Mills plant, to C. M. Guest & Sons, Anderson, $8,500.

**R. I., Providence**—City, C. A. Maguire, comr. P. Wks., City Hall, constructing c.i. pipe water supply system in Woodward Rd. section, North Providence and Johnston, day labor. Total est. $125,000. Bd. Contr. & Supply, at office City Clerk, awarded c.i. pipe, to U. S. Pipe & Fdry. Co., 250 Stuart St., Boston; gate valves, to Reading, Pratt & Cady Co., Inc., 69 A St., South Boston, Mass.; pig lead, to Congdon & Carpenter Co., 405 Promenade St.; special iron castings, to Builders Iron Fdry., 9 Codding St. Bids Apr. 13. F. S. Nolan, city engr.

**Wash., Mansfield** — Town, constructing steel standpipe with concrete base, to Pittsburgh-Des Moines Steel Co., 915 Tuttle St., Des Moines, Ia., $5,438. Bids Apr. 14, awarded Apr. 14. Noted Apr. 10, C.D.

**Wis., Park Falls**—City, laying 1.62 mi. 8 in. water mains, to D. W. Morgan, Ladysmith, 66c. per ft.; pipe, to Crane Co., 156 North Jefferson St., Chicago, Ill., $1.29 per ft. Bids Apr. 9. Noted Mar. 20, C.D.—Mar. 26, E.N.-R.

## SEWERAGE AND WASTE DISPOSAL

### PROPOSED WORK

**California**—Voted bonds for main and lateral sewers in Gustine, $8,000; sewerage system in Chowchilla, $15,000.

★ **Conn., Bridgeport** — Metropolitan Sewer Dist., preliminary survey and estimate for Metropolitan Sewer District in Trumbull, Stratford and Fairfield. $4,000,000. E. Copeland, State Water Comn., engr. Project requires Legislative Enabling Act before further procedure.

**Conn., Hartford**—Metropolitan Dist. plans repairing sanitary and storm sewers, damaged by flood, throughout the city. $86,974. R. N. Clark, Municipal Bldg., ch. engr. W.P.A. Flood Emergency Project.

**Conn., Manchester**—Town, started survey to determine cost of sewage disposal system, for 8th School and Utility Dist. To exceed $25,000. J. F. Bowen, 570 Woodbridge St., engr.

**D. C., Wash.**—District Comrs., District Bldg., rejected bids Feb. 11, constructing Unit 8 sewage disposal plant. Will readvertise. Noted Feb. 14, C. D.—Jan. 30, E. N.-R.

**Ill., Paris**—See "Waterworks."

**Ind., LaPorte**—Bd. P. Wks., L. Darrow, chn., soon takes bids constructing sewage disposal plant and intercepting sewers, $250,000. P.W.A. project. R. B. Moore & Co., Inc., 930 Indiana Pythian Bldg., Indianapolis, engrs.

**Minn., Faribault**—City election May 5, to vote bonds, constructing sewage disposal plant. P.W.A. project. I. Smith, city engr. Buell & Winter Eng. Co., 503 Insurance Exch., Sioux City, Ia., consult. engrs. Noted Dec. 12, 1934, C. D.—Dec. 20, 1934, E. N.-R.

**Minn., Minneapolis**—University of Minnesota, Bd. Regents, R. S. Callaway, purch. agt., 323 Administration Bldg., made plans constructing interceptors and storm sewers to connect with Minneapolis-St. Paul Sanitary District Disposal System.

## Section Index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*Projects $500,000 and over symbol* ★

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*E. N.-R. Engineering News-Record*

*Federal Government projects symbol* †

◆

†*Federal Government*

***For official proposal advertising see Searchlight Section***

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WORTHINGTON
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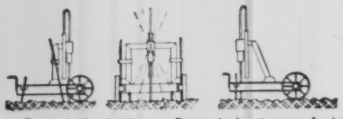
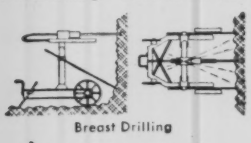
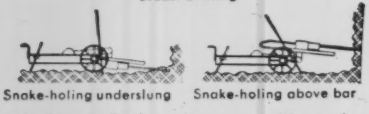
Line drilling



Down-hole drilling  Down-hole at rear of wheel



Breast Drilling



Snake-holing underslung  Snake-holing above bar

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Sewerage, etc. (Continued)

**N. Y., Albany**—City plans new sewers in 16th Ward, bounded by Western Ave., Orlando St., Russell Rd. and Wellington Ave. To exceed $23,000. J. J. McMannus, city engr.

**N. Y., Beacon**—City made plans constructing sewage treatment plant. $149,257. Applied for P.W.A. funds. **Maturity soon.** Barker & Wheeler, 36 State St., Albany, engrs. Noted Dec. 2, C. D.—Dec. 5, E. N.-R.

**N. Y., Liberty**—Bd. Supervs. Sullivan Co., Court House, Monticello, plans 2.5 mi. drainage sewers in road from Liberty to Cooley Rds. To exceed $23,000. A. Toaspern, supt. Hys.

**N. Y., Long Island City**—J. J. Halleron, acting pres. Queens Boro, Queens Subway Bldg., rejected bids Apr. 8, sewer in Queens Blvd. Noted Apr. 9, C.D.

**N. Y., Oneonta**—City plans rehabilitation of sewage disposal plant, at West End, and repairing damage caused in vicinity by high water this spring. To exceed $23,000. May apply for federal funds. F. M. Gurney, city engr.

**N. Y., Stella** — Town of Dickinson, Stella Sewer Dist., 239 Main St., Johnson City, soon takes bids furnishing, installing 8- to 15-in. storm sewer in Stella District. $32,133. Nussbaumer & Clarke, Inc., 327 Franklin St., Buffalo, engrs. P.W.A. project. Noted Jan. 14, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

**Pa., Kittanning**—Borough, Council Chambers, new plans completed for 3,550 ft. 12 and 24 in. c.i. pipe, 800 ft. 24 in. terra cotta sewer in Water St. Bids Mar. 2 rejected. W. Gaye, Market St., engr. Noted Mar. 16, C. D.—Mar. 19, E. N.-R.

**Pa., Loyalsockville**—Loyalsock Twp., Lycoming Co. and Loyalsock Village, making preliminary plans sanitary sewerage system, Kenmar area. $10,000 to be spent for materials. Owner purchases materials. Project submitted to W.P.A. soon. M. C. Krause, Court House, Williamsport, co. engr.

**Wash., Colfax**—City plans constructing outfall sewer line. $28,474. M. J. Hanley, City Hall, engr.

## BIDS ASKED

**Calif., Stockton**—City Council, taking bids 275 lin.ft. 12 in. vitr. clay pipe, 4,950 ft. 24 in. vitr. clay pipe encased in concrete cradle, fifteen 5 ft. brick manholes, replace pavements, etc. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

**Calif., Vallejo**—City, A. Edgecumbe, city clk., taking bids 40 lin.ft. 48 in. I.D. rein.-con. and 1,780 lin.ft. 12- to 33-in. vitr. clay sewers in Virginia St., Schedule "A"; 88 lin.ft. 30 in. I.D. rein.-con. and 2,208 lin.ft. 12- to 36-in. vitr. clay sewers, Sonoma St., Schedule "B." T. D. Kilkenny, city engr.

★ **Conn., Middletown**—May 15, by P. Wks. Dpt., sewage disposal plant and appurtenances, also sludge incinerator. Contrs. B-2 and B-3. P.W.A. project. Total est. $550,000. Thomas F. Bowe, 110 William St., New York, engr. Noted Mar. 3, C. D.

**Mass., Chicopee**—See "Contracts Awarded."

**Mass., Fall River**—See "Contracts Awarded."

**Mass., Gardner**—See "Contracts Awarded."

**Mass., Marlboro**—See "Contracts Awarded."

**Mass., Springfield**—See "Contracts Awarded."

**Minn., Renville**—May 15, by City, F. Dunwell, clk., 21,630 lin.ft. 8- to 12-in. sanitary sewerage system, three hundred twenty 8x6 and twenty-five 10x6 wyes, 64 manholes and flush tanks. $30,000. P.W.A. project. M. E. Chamberlain, Montevideo, engr. Bids Apr. 13 rejected. Noted Apr. 1, C. D.—Apr. 9, E. N.-R.

**N. J., Manville**—May 6, by Mayor and Council, Boro Hall, South Main and Orchard Sts., Contr. B general contract, Contr. C electrical work, Contr. D, heating and ventilating, Contr. E plumbing, for complete construction pumping station and sewage treatment plant. C. J. Kupper, 409 East Main St., Bound Brook, consult. engr.

**N. Y., Buffalo**—May 19, by Buffalo Sewer Authority, City Hall, constructing 8,600 ft. 11½ ft. semi-elliptical sewer and 335 ft. 8 ft. circular sewer with manholes and appurtenances in Old Erie Canal between Charles St. and railroad bridge at the front, etc. P.W.A. project; adv. E. N.-R., Apr. 30.

**N. Y., Lake George** — See "Contracts Awarded."

**N. Y., Long Island City**—May 4, by J. J. Halleran, acting pres. Queens Boro, Queens Subway Bldg., completing sewer and appurtenances, north and south side Queens Blvd., Cornish, 47th and 46th Aves., 74th, 76th and 79th Sts.

**N. Y., New York**—May 6 (extended date), by Dpt. Sanitation, 125 Worth St., New York, main sewage and service water pumping units, Contr. C-1; return sludge pumping units, Contr. C-2; excess sludge pumping units, Contr. C-3; motor driven blower units, Contr. D; heating boilers and settings, Contr. H, for Wards Island Sewage Treatment Works, Sect. 3, P.W.A. project. Noted Apr. 6, C. D.—Apr. 9, E. N.-R.

**N. Y., New York**—May 13, by Dpt. Sanitation, T. W. Hammond, comr., 125 Worth St., New York, constructing heating and ventilating Contr. 15, Manhattan Grit Chamber, and Contr. 16, Bronx Grit Chamber; plumbing, Contr. 17, Manhattan Grit Chamber and Contr. 18, Bronx Grit Chamber, for Wards Island Sewage Treatment Plant, Sect. 4, P.W.A. project.

★ **N. Y., New York**—May 13, by Dpt. Sanitation, T. W. Hammond, comr., 125 Worth St., New York, constructing Manhattan Grit Chamber superstructure, Contr. 13, $3[illegible] and Bronx Grit Chamber superstructure, Contr. 14, $339,000, for Wards Island Sewage Treatment Works, Sect. 4.

**N. Y., New York**—May 25, by Dpt. Sanitation, T. W. Hammond, comr., 125 Worth St., constructing electrical equipment, Sect. 3 and 4, Contr. EMQ, for Wards Island Sewage Treatment Works, Sect. 3, P.W.A. project.

**N. Y., Orangeburg**—May 20, by Dpt. Mental Hygiene, State Office Bldg., Albany, sewage disposal plant, Contr. 2, at Rockland State Hospital. $151,796.

**N. Y., Salamanca**—See "Contracts Awarded."

**N. Y., Troy**—See "Contracts Awarded."

**Pa., Mount Penn**—May 6, by G. H. [illegible], secy. Borough Council, constructing sanitary sewerage system, sewage disposal or treatment plant. $278,589. Bids to be received on 4 contracts (a) est. $156,745 (b) est. $[illegible] (c) est. $13,164 (d) $76,000. P.W.A. project. W. E. Dechant & Sons, 632 Washington St., Reading, engrs. Noted Jan. 11, 1935, C. D.—Jan. 17, 1935, E. N.-R.

## CONTRACTS AWARDED

**Calif., Laguna Beach**—City Clerk, constructing sanitary sewer involving 14,903 ft. 8 in., 2,580 ft. 6 in. vitr. clay pipe and 170 ft. 4 in. c.i. pipe Dist. 2, to N. Chutuk, 4915 W. 3rd Blvd., Los Angeles, $34,393 est. $35,000; sewers in Lateral Dist. 3, involving 2,241 ft. 10 in., 27,602 ft. 8 in., and 5,075 ft. 6 in. vitr. clay pipe, 138 ft. 8 in. c.i. pipe, to J. L. Kruse, 1759 North Eastern Ave., Los Angels, $82,609 est. $75,000. Bids Apr. 8, awarded Apr. 13, **P.W.A.** Noted Apr. 16, E.N.-R.

**Conn., Milford**—Town, R. C. Stoddard, chn. Sewer Comm., constructing Contr. B2, section sewage disposal plant, to O'Neil Bros., Inc., 22 Preston St., Hartford, $136,175. Bids Apr. 9, awarded Apr. 16. Noted Apr. 17, C. D.—Apr. 2, E. N.-R.

**Ga., Atlanta**—City, constructing Part 2, Utoy Creek disposal plant, to Dorr Co., 1665 Noble Dr., $6,689***Sect. 3, disposal plant equipment, to Burford Haie & Smith, 140 Edgewood Ave., $563***furnishing tanks, Sect. 4, disposal plant, to Pacific Flush Tank Co., 4241 North Ravenswood Ave., Chicago, Ill., $5,417***furnishing equipment for Sect. 5, Utoy Creek disposal plant, to Chain Belt Co., 1600 West Bruce St., Milwaukee, Wis., $2,300. Grand total $14,969. Noted Apr. 15, C. D.—Apr. 23, E. N.-R.

**Ind., LaPorte**—Bd. P. Wks., sludge incinerator, to Nichols Eng. & Research Co., 40 Wall St., New York, N. Y., $24,800***chlorinator, to Pardee Eng. Co., 9 South Clinton St., Chicago, Ill., $1,875***primary clarifying equipment, to Chain Belt Co., 1600 West Bruce St., Milwaukee, Wis., $6,680***screen and grinder, to Jeffrey Eng. Co., 1st Ave., Columbus, O., $2,075. Grand total $35,510. **P.W.A.** Bids Dec. 28. Noted Oct. 30, C. D.

**Mass., Barnstable**—Cenadella Constr. Co., general contractors, Milford, 100 tons reinforcing steel for sewage disposal plant, to Northern Steel Co., Medford, for Town, C. A. Crocker, chn. Bd. Selectmen, Town Hall. Noted Mar. 17, C.D.—Mar. 19, E.N.-R., under "Contracts Awarded."

**Mass., Chicopee**—City, A. J. Stonina, mayor, City Hall, rebuilding concrete pipe sewer line in McKinstry Ave., day labor, damaged by flood, $50,000. E. Bourbeau, supt. Hy. Dpt.

**Mass., Fall River**—City, T. J. Logan, comr. P. Wks., City Hall, constructing incinerator, day labor, under **W.P.A.** Est. $125,000. Owner takes bids on equipment later.

**Mass., Gardner**—City, R. Burns, agt., City Hall, reconstructing culvert flood damage in various streets, using concrete pipe, day labor under **W.P.A.** $20,000-$25,000.

**Mass., Marlboro**—City, L. F. Granger, W.P.A. dir., City Hall, rebuilding 500 brick, stone catch basins in various streets, day labor. Est. $33,600.

**Mass., Springfield**—City, C. W. Phillips, supt. Dpt. Streets & Eng., City Hall, repairing Willimansett Sewerage System, day labor under **W.P.A.** $116,914.

**Minn., Willmar**—State, c/o Bd. Control, State Office Bldg., St. Paul, furnishing and placing 4,200 lin.ft. 8 in. c.i. sewer main, constructing pump house, furnishing, installing sewer pumps, sewage treatment plant at State Asylum, to M. J. O'Neil, 609 New York Bldg., St. Paul, $51,625. Bids Apr. 9. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**Mo., Kansas City** — City, joint storm and sanitary sewer in Park Hill Rd. from Oak to Homes Sts., to Boyle Tryor Constr. Co., 226 West 39th St., Kansas City, about $87,000.

**Neb., Crawford**—City, sewage disposal plant, to H. J. Peterson Co., 3258 Grover St., Omaha, $26,466. **P.W.A.** Bids Mar. 25. Noted Apr. 15, C. D.

**Neb., Ingleside**—Nebraska State Bd. Control, Lincoln, sewerage system, to C. Robeck & Co., Omaha, $24,397. **P.W.A.** Bids Mar. 30. Noted Mar. 15, C. D.—Mar. 19, E. N.-R.

*Constr. News page 300*

†*Federal Government*

sewerage, etc. (Continued)

**N. Y., Lake George** — Village, constructing sewage disposal plant, relief labor; reinforcing steel to Albany Steel & Iron Supply Co., Troy Rd., Albany***Portland cement, to Glens Falls Portland Cement Co., Glens Falls. Est. $200,000. **W.P.A.** M. Vrooman, Inc., 21 North Main St., Gloversville, engr.

**N. Y., Long Island City**—J. J. Halleran, acting pres. Queens Boro, Queens Subway Bldg., to Federico & Alinovi, 95-06 21st Ave., Elmhurst, sewers in Dry Harbor Rd., $1,290***to A. Catapano, 36 Ashford Pl., Brooklyn, Saultell Ave., $30,359***to Ozone Contg. Co., 95-06 21st Ave., Elmhurst, 179th St., $924; Daniels St., $2,420***to Orville Contg. Co., 68-54 Orville St., Forest Hills, 96th St., $1,046; 116th Ave., $864; 123rd Ave., $695***to P. Tomasetti Contg. Co., 1074 60th St., Brooklyn, Peck Ave., $208,319***to Den Spa Contg. Co., 222-08 Jamaica Ave., Turin Dr., $1,756. Grand total $247,673. Bids Mar. 23. Noted Mar. 24. C. D.—Mar. 19. E. N.-R.

**N. Y., Long Island City**—J. J. Halleran, acting pres. Queens Boro, Queens Subway Bldg., to Di Salvo Contg. Co., 2441 Butler St., East Elmhurst, sewers in North Hempstead Turnpike $125,842***to Napard Contg. Co., 173-04 124th St., St. Albans, 114th Ave. $1,757; 116th Ave. $1,587; 119th Ave. $1,051; 128th Ave. $1,531; 173rd St. $564; 199th St. $592; Dorman Rd. $1,788; Gold Court 1,776***to P. Ambrosio, 674 Glenmore Ave., New York Blvd. $1,455. Grand total $137,943. Bids Mar. 11. C. D. —Feb. 6. E. N.-R.

**N. Y., Salamanca**—Village, constructing intercepting sewer, laterals, south side of Allegany River, opposite Front Ave., relief labor. Est. about $25,000. **W.P.A.** E. Noonan, Bailey Bldg., Lockport, procurement officer W.P.A., will purchase materials.

**N. Y., Troy** — City, replacing 8 in. sewer lines with 21 in. combination sewer line, manholes, replacing sidewalks and paving Lee, Warren, Lake and Rankin Aves., relief labor, $146,220. **W.P.A.** J. W. Carroll, Old Post Office Bldg., Albany, procurement officer W.P.A., will purchase materials.

**Pa., Grove City**—Henry Schenk Co., general contractors, 12th and Sassafrass St., Erie, reinforcing steel for addition to sewage disposal plant, incl. aeration units, sludge digesters, secondary settling tanks, pumps, station, heating system, piping and necessary appurtenances, to Paterson-Leitch Co., 900 East 69th St., Cleveland, O.***c.i. pipe, to U. S. Pipe & Fdry. Co., Koppers Bldg., Pittsburgh***valves, to Rensselaer Valve Co., Troy, N. Y.***aeration equipment, to American Well Wks. Co., 20 North Wacker Dr., Chicago, Ill., for City, H. F. Smith, boro clk. Noted Dec. 10. C. D.— Dec. 12. E. N.-R., under "Contracts Awarded."

**Wis., Oshkosh**—City, constructing intercepting sewer in High St. and North Bank Interceptor, to H. Hohensee Constr. Co., 2808 South 15th St., Milwaukee, $72,682 and $59,114 respectively***North Lake Winnebago and South Bank Interceptor, to G. E. Zimmerman, 3402 West Wisconsin Ave., Milwaukee, $28,092 and $76,661 respectively***Lake Drive Interceptor and South Lake Winnebago to J. Rasmussen, Oshkosh, $40,673 and $63,005, respectively. Grand total $340,227. Noted Mar. 27, C. D.— Apr. 2, E. N.-R.

## BRIDGES AND GRADE CROSSINGS

### PROPOSED WORK

**Iowa**—State Hy. Comn., Ames, soon takes bids constructing one 144x24 ft. continuous I-beam bridge, 2 rein.-con. box and 1 rein.-con. pipe culverts on secondary road between Sects. 3 and 4, T9CN, R14W, Cedar Falls Twp., at I.C.R.R. northwest of Cedar Falls, Black Hawk Co., 1,700 lin.ft. creosoted piling, 835 cu.yd. Class 1 excav.; one 137x24 ft. continuous I-beam bridge over C. B. & Q. R.R. on secondary road at railroad crossing west of Emerson, between Sects. 21 and 22, Indian Creek Project, Mills Co., 225 cu.yd. Class 1 excav.; 152x24 ft. continuous I-beam bridge, 123 cu.yd. Class 1 and 140 cu.yd. Class 2 excav. on same road. F. R. White, Ames, ch. engr.

**Iowa**—State Hy. Comn., Ames, soon takes bids constructing 120x20 ft. continuous I-beam bridge, on secondary road, between Sects. 10 and 15, Knox Twp., Clarke Co., incl. 55 cu.yd. Class 1, 95 cu.yd. Class 2, and 2,486 cu.yd. channel excav. F. R. White, ch. engr.

**Ia., Cherokee**—Cherokee Co., H. M. Montgomery, aud., plans bridges and culverts on secondary roads. $33,625. W. T. Hosmer, co. engr.

**Ia., Clarinda**—Page Co., G. G. Graff, aud., plans bridges and culverts. $78,483. R. C. Brown, co. engr.

**Ia., Fort Madison**—Lee Co., N. J. Tucker, aud., plans bridges and culverts on secondary roads. $32,018. M. G. McFarland, co. engr.

**Ia., Rockwell City**—Calhoun Co., E. Betthauer, aud., plans constructing bridges $85,000, culverts $24,150, on secondary roads. W. E. McLure, co. engr.

**Maine**—State Hy. Comn., Augusta, plans rebuilding single span, concrete and structural steel bridge in Brewer, destroyed by flood. $25,000. L. D. Barrows, State House, Augusta, ch. engr.

†*Federal Government*

**Mass., Athol**—Town, W. C. Karner, chn. Bd. Selectmen, Town Hall, plans rebuilding 50 ft. span structural steel bridge on concrete abutments, Chestnut Hill Ave., $15,000; Fryville Bridge, structural steel span on concrete abutments, $20,000; Tully Rd. Bridge, structural steel span on concrete abutments, $20,000, destroyed by flood. Asking state aid. J. G Cotton, supt. Streets.

**Mass., Barre**—Town, S. C. Chase, chn. Bd. Selectmen, Town Hall, plans rebuilding 40 ft. rein.-con. span bridge in South Barre, $30,000; 30 ft. rein.-con. span Powder Mill Bridge, South Barre, $20,000; 20 ft. rein.-con. span bridge, Mechanic St., $12,000; 40 ft. rein.-con. span Herrick Bridge, all recently destroyed by flood. Engineer not appointed.

**Mass., Fitchburg**—City, J. Pierce, chn. Bd. P. Wks., City Hall, plans repairing flood damaged 27 ft. span rein.-con., steel bridge, Townsend St., $20,000; replacing concrete abutments of 70 ft. steel truss bridge, Circle St., $15,000. **Maturity indefinite.** Committee investigating.

**Mass., Lowell**—City, G. P. Le Grand, supt. Streets, City Hall, plans rebuilding Aiken St. Bridge, incl. reconstructing abutments, deck sidewalks and steel stringers, damaged by recent flood. $150,000. **Maturity indefinite.** S. Kearney, City Hall, city engr.

**Mass., Orange**—Town, C. H. Stevens, chn. Bd. Selectmen, Town Hall, plans rebuilding 1 span concrete, steel bridge, Tulley Rd., $10,000; 2 span concrete, steel bridge, South Main St., $20,000, damaged by flood. Seeking State aid. Engineer not appointed.

**Mass., Royalston**—Town, C. H. Brown, chn. Bd. Selectmen, Town Hall, plans rebuilding concrete, steel bridge over Mill River at South Royalston, $15,000; concrete, steel bridge over Mill River near Mason Parker Co., $10,000, both flood rebuild projects. Engineer not appointed.

**Mass., Ware**—Town, M. L. Jordan, chn. Bd. Selectmen, Town Hall, plans rebuilding 1 span steel I-beam bridge on Gilbertville Rd., destroyed by flood. $25,000.

**Missouri**—State Hy. Dpt., Jefferson City, soon takes bids constructing one 10 ft. rein.-con. slab span bridge over Buck Creek, two 34 ft. and one 30 ft. I-beam spans over Little Pole Cat Creek, one 20 ft. rein.-con. slab bridge over Buck Creek, one 8 ft. rein.-con. slab span bridge over Buck Creek, all foregoing on Bethany Gallatin Rd., Route 13, and one 20 ft. rein.-con. slab span bridge over Stream on New Hampton-Hatfield Rd., Route SD, all foregoing Harrison Co.; one 16 ft. rein.-con. slab span bridge over stream, and one 20 ft. rein.-con. bridge over Smoke Creek on Meadville Rd., North Route SD, Linn Co.; one 31 ft. and two 25 ft. I-beam span bridge over Hickory Creek and two 31 ft. I-beam spans over East Fork, Hickory Creek, Fairfax Rd., East, both Atchison Co.; one 20 ft. rein.-con. slab span over Big Creek, Route 275 to New Point, Holt Co.; three 45 ft. rein.-con. deck girder span bridge with 24 ft. roadway, concrete substructure over Wabash R.R. on Moberly Rd. East and West, Route 24, Randolph Co.; two 12 ft. rein.-con. slab spans over Steer Creek, Kirksville North and South, Adair Co.; four 24 ft. rein.-con. slab span bridge over Holden Creek, Route 366 to 16, Route 31 AP, Buchanan Co.; two 8-ft. rein.-con. slab span bridge over Dick Creek, in Gower-Trimble Rd., Route 169, Clinton Co.; three 20 ft. I-beam span bridge, concrete floor over Little Cypress Creek, Gallatin North and South Rd. Route 13 AP, Daviess Co.; one 10 ft. rein.-con. bridge over stream, on Strawberry North and South Rd., Route 169, Gentry Co. T. H. Cutler, Jefferson City, state. hy. engr.

**New Hampshire**—State Hy. Dpt., F. E. Everett, comr., D. H. Dickinson, ch. engr., Patriot Bldg., Concord, plans rebuilding bridges over Merrimack River at Webster and Hooksett; over Connecticut River at Lyme and North Walpole, no estimates for same; bridge over Israel River, Jefferson; Dairsville Bridge, Warner, $20,000; Rocky Branch Bridge, Ossippee, $15,000; on Route 19, Rindge, $15,000; over Suncook River, Concord, $20,000; over Pascataquog River, New Boston, $25,000; over Ossippee River, Effingham, $15,000, recently destroyed or damaged by flood.

**New York**—Dpt. P. Wks., Albany, plans constructing steel, concrete viaduct over N. Y., O. & Western R.R. tracks at Egli Farm; steel, concrete underpass beneath tracks of same railroad near Peckham Farm on Sidney-East Guilford Hy., near East Guilford, Delaware Co. To exceed $46,000.

**New York**—Thousand Island Bridge Authority, c/o Dpt. P. Wks., Albany, plans constructing toll bridge over St. Lawrence River, across International Rift from point on Wells Island to Hills Island; bridge over westerly channel St. Lawrence River from point near Ivy Lea in Leeds Co., Ontario, Canada, to Hill Island; bridge over easterly channel, St. Lawrence River, near Collins Landing, Orleans, Jefferson Co. from mainland to Wells Island. To exceed $69,000. Project approved by Governor Lehman. T. F. Farrell, state hy. engr.

★**N. Y., Batavia**—Lehigh Valley R.R., G. H. Hand, ch. engr., Bethlehem, Pa., New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, and Erie R.R. Co., G. S. Fanning, ch. engr., Midland Bldg., Cleve-

*Constr. News page 391*


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Bridges, etc. (Continued)

land, O., revised plans eliminating grade crossings in Batavia. $1,500,000. Noted Aug. 7, 1934, C.D.—Aug. 9, 1934, E.N.-R.

**N. Y., Buffalo**—Bd. Supervs. Erie Co., County Bldg., plans constructing and reconstructing steel, concrete bridges throughout county, near here. $120,000.

**N. Y., Rochester**—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, plans constructing steel, concrete grade crossing elimination over Blossom Rd. $360,000. **Maturity in fall or later.**

**N. Y., Sidney**—Dpt. P. Wks., State Office Bldg., Albany, bids late in May constructing steel, concrete bridge over Susquehanna River to replace bridge connecting Sidney with Route 7. To exceed $23,000.

**N. Y., Yonkers**—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, plans steel, concrete grade crossing elimination at Dunwoodie St. $320,300.

**Ohio**—See "Contracts Awarded."

**Texas**—State Hy. Comn., H. Hines, chn., Austin, soon takes bids C. R. I. and G. overpass, approaches, Hy. 2, W.P.G.H. 41, Part 2, Tarrant Co., $137,140; constructing Southern Pacific and G. C. and S. Fe R.R. overpass and approaches, grading, drainage structures, etc., on South Main St., Fort Worth, W.P.G.M. 942-A, Tarrant Co., $265,000. New P.W.A. project.

**Wash., Bellingham**—City, City Hall, made plans 350 ft. rein.-con. bridge, Squalicum Creek. $55,000. J. M. Adams, City Hall, engr.

**Wis., Racine**—Secretary Dern approved application for constructing one leaf bascule type bridge over Root River at 4th St., $250,000. To seek P.W.A. funds. J. W. Beaugrand, city engr.

**Alta., Red Deer**—Canadian Natl. R.R. prepares plans steel bridge over Red Deer River. $30,000.

**Ont., Port Hope**—Town and Dpt. Hys., Toronto, plans repairing or replacing concrete bridge damaged by flood, Hy. 2. $25,000.

**Que., Gaspe**—Municipality making plans concrete bridge over Dartmount River. $200,000. Contingent upon Federal Govt. aid.

## BIDS ASKED

**Arizona**—May 7, by State Hy. Dpt., Phoenix, concrete, steel bridge, grading, draining and oiling on St. Johns-Sanders Hy., U. S. 81, Apache Co. T. S. O'Connell, Phoenix, engr.

**Arkansas**—See "Streets and Roads."

**Ark., Ft. Smith**—See "Contracts Awarded."

**California**—May 13, by State Hy. Comn., Sacramento, rein.-con. bridge and 1.5 mi. hy. between point 4 mi. north of Willows and 1 mi. south of Artois of which 0.5 mi. is to be graded and plant mixed on crusher run base surfaced, etc., Glenn Co. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

**California**—May 14, by State Hy. Comn., State Bldg., Los Angeles, constructing overhead crossing consisting of one 37 ft., two 34 ft. and two 8 ft. spans, over tracks of Atchison, Topeka & Santa Fe Ry., 1 mi. north of Box Springs, Riverside Co. C. H. Purcell, P. Wks. Bldg., Sacramento, ch. hy. engr.

**Calif., San Francisco**—See "Waterworks."

**Ill., Chicago**—May 5, by secretary Chicago Park Dist., E. A. Julius, ch. of Purchasing Div., Administration Bldg., Burnham Park, constructing steel superstructure, retaining walls, and drainage for approaches to Chicago River Bridge. P.W.A. project. Bids Mar. 3 rejected. Noted Mar. 5, C.D.—Feb. 20, E. N.-R.

**Kentucky**—May 8, by State Hy. Comn., Frankfort, bridge having two 40 ft. rein.-con. deck girder spans, over Valley Creek in Elizabethtown, Project WPMH 79 C-B; two 25 ft. rein.-con. deck girder bridge on Stanford-Mt. Vernon Rd., Lincoln-Rockcastle Co., line and replacing pavement on approaches, Project WPH 148 B-B, Lincoln Co.

**Louisiana**—May 6, by State Hy. Comn., Baton Rouge, bridge and approaches on 0.366 mi. Beggs-Port Barre Hy., Route 214, Project 984, WPMS 311, St. Landry Parish; overpass and approaches 0.277 mi. Alexandria-Monroe Hy., Route 615, Project 4955, WPGS 305-B, Rapides Parish; bridge and approaches on 0.561 mi. Intersection Route 124-Little Bayou Sara Hy., Route 855, Project 1155, Readvertisement WPSO 363, West Feliciana Parish; bridge and approaches 0.112 mi. Thibodaux-Vacherie Hy., Route 83, Project 549-E, WPMS 300, Lafourche Parish.

**Maryland**—See "Streets and Roads."

**Massachusetts**—May 5, by Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston, grade crossing Project WPGH 280-A, through steel plate girder railroad bridge with solid wrought iron plate floor and stone ballasted tracks, 1,100 lin.ft. bituminous macadam or penolithic type approaches, Amherst. To exceed $50,000. G. H. Delano, 100 Nashua St., ch. engr.

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**Mass., Fall River**—See "Contracts Awarded."

**Mo., St. Charles**—May 6, by Wabash R. Co. E. L. Crugar, ch. engr. C/o receivers R. Pitcairn and F. C. Nicodemus, Jr. and W. St. Charles Bridge Co., Railway Exch., St. Louis, ballast materials for approach railroad bridge across Missouri River to St. Charles and St. Louis Co. P.W.A. project.

**Neb., North Platte**—City takes bids May 28, constructing viaduct over Union Pacific R.R. tracks. $81,719. Bonds. Noted Jan. 2, C. D.—Jan. 9, E. N.-R.

★ **New York**—May 5, by Dpt. P. Wks., Albany, constructing 102 ft. timber and graveling approaches on 0.12 mi. Moss Rd., WPSO 914-B, Allegany Co., $47,013; ft. over Rutland R.R., on Malone-Fort Covington Rd. Part 1, WPGH 580-E, Franklin Co., 729; 193 ft. rein.-con. bridge over New Central R.R. on Batavia-Bergen Rd., P. S.H. 8197, Genesee Co., $261,598; 63 ft. bridge over Lehigh Valley R.R. on West Henretta-West Rush Rd., Monroe Co., $168,20[illegible] 22 ft. slab bridges on Richford-Hartford Rd., Tioga Co., $36,453. Total est. $56[illegible] adv. E. N.-R., Apr. 30.

**New York**—May 7, by Triborough Bridge Authority, 111 8th Ave., New York, constructing connecting roads on Randalls Island for Triborough Bridge, connecting Manhattan, Bronx and Queens Boros. P.W.A. project. P. Lee[illegible] dir., adv. E. N.-R., Apr. 30.

**N. Y., Binghamton**—City, City Hall, takes bids constructing underpass at approach to New Ferry Street Bridge. $182,642. P.W.A. project. A. B. Cohen, 1 Madison Ave., New York, engr.

**N. Y., Buffalo**—See "Contracts Awarded."

**N. Y., Stapleton**—May 4, by H. A. Lane, ch. engr. Staten Island Rapid Transit R.R., B. & O. Central Bldg., Baltimore, Md., constructing elimination of grade crossings, at Tompkinsville-Stapleton. P.W.A. project.

**Ohio**—May 5, by J. J. Jaster, Jr., state hy. dir., Columbus, reconstructing existing separation crossing with New York Central R.R. Co., 0.21 mi., incl. grading, drainage structures, roadside improvement and overhead hy. structures, Cuyahoga Co. $169,838.

**Pennsylvania**—See "Streets and Roads."

**South Carolina**—See "Streets and Roads."

**Utah**—May 7, by State Rd. Comn., Salt Lake City, constructing steel beam and concrete underpass under Bamberger Electric R.R., Davis Co., incl. 18,350 cu.yd. unclassified excav., K. C. Wright, state road engr.

**Washington**—See "Contracts Awarded."

**Ont., Morewood**—May 4, by J. Steen, clk., Winchester Twp., 40 ft. rein.-con., steel bridge, Ormond Rd. F. M. Eagleson, Orangeville, engr.

**Texas and Louisiana**—May 6, by G. Gilchrist, state hy. engr., Austin, Tex., and State Hy. Comn. of Louisiana, Baton Rouge, La., constructing steel, concrete Sabine River Bridge and approaches on Hy. 87, WPSS 822, Newton Co., for Joint Hy. Comn. of Texas, Austin, and Hy. Comn. of Louisiana, H. Hines, chn., Baton Rouge. New P.W.A. project.

**Wisconsin**—See "Streets and Roads."

## CONTRACTS AWARDED

**Ark., Ft. Smith**—Kansas City Southern Ry., Kansas City, Mo., repairing and rebuilding trestle and bridge approach at west end over Poteau River, day labor and separate contracts, $200,000.

**Calif., Oakland**—District Directors Joint Hy. Dist. 13 constructing pipe culvert with appurtenant structures in Chabot Rd., involving 750 cu.yd. Class A and 100 cu.yd. Class B excav. (structural), 90 lin.ft. 24 in. and 300 lin.ft. 7¼ ft. corrugated metal pipe culvert, 500 cu.yd. rock for drains, 400 cu.yd. rubble masonry, force account. Bids Apr 9 rejected. W. B. Boggs, 1448 Webster St., engr. Noted Apr. 15, C.D.

**Indiana**—State Hy. Comn., Indianapolis, constructing bridges in Fulton Co., to L. W. Lamb, Fennville, Mich., **$57,692** est. **$73,718**; 2 bridges in Clay Co., to Foulkes Contg. Co., 705½ Ohio St., Terre Haute, **$26,746** est. $28,768. Bids Apr. 7. Noted Apr. 13, C.D.—Mar. 26, E.N.-R.

**Indiana**—State Hy. Comn., Indianapolis, constructing bridge over Quade Ditch and Big Sand Creek, near Reddington, Jackson Co., to I. E. Smith, Richmond, **$64,928**. Est. $70,551. Bids Mar. 10. Noted Mar. 13, C.D.—Feb. 27, E.N.-R.

**Iowa**—State Hy. Comn., Ames, constructing bridge in Black Hawk Co., to A. Olson Constr. Co., Waterloo, **$37,343***1** corrugated metal pipe culvert extension, 3 rein.-con. pipe and 6 rein.-con. box culverts Bremer Co., to F. A. Moser, Strawberry Point, **$2,604***two** 65x24 ft. multiple span overhead crossing in Louisa Co., to Lundgren Reis Co., 125 College Ave., Des Moines, **$22,139***5** concrete pipe and 6 concrete box culverts, Osceola Co., to Hattendorf Constr. Co., Ockeyedan, **$5,302***20x80** ft.

†*Federal Government*

Bridges, etc. (Continued)

pony truss and raising and resurfacing concrete deck girder bridge in Osceola Co., to Snyder & Johnson, Inc., Humboldt, **$28,383*****one 24x24 ft. concrete rigid frame separate bridge, two 17x24 ft. and one 18x24 ft. continuous bridge, Scott Co., to A. Melberg, and Perry Jayne, Cedar Rapids, **$19,515*****one 30 ft. rein.-con. arch bridge in Scott Co., to J. H. Hunzinger, 406 Security Bldg., Davenport, **$10,167.** Grand total $125,453. Bids Apr. 14, awarded Apr. 18. Noted Apr. 20, C.D.—Apr. 9, E.N.-R.

**Kansas**—State Hy. Comn., at office County Clerk, Hays, constructing rein.-con. deck girder span Bridge 0.3, WPSO 552, Decatur and Norton Counties, and four 70 ft. concrete I-beam spans, P. 40S-10-WPMH 388 D. Ellis Co., to A. L. Cook, Ottawa, **$18,527** and **$65,905** respectively. Bids Apr. 10. Noted Mar. 27, C.D.—Apr. 2, E.N.-R.

**Kan., Liberal** — Owner, c/o Matthews & Kehan, engrs., Smith-Young Tower, San Antonio, Tex., constructing 1,800 ft. steel pile trestle to carry two 20 in. gas lines and walkaway across Cimaron River, near here, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., about **$200,000.**

**Maryland** — State Roads Comn., Baltimore, single 42 ft. span steel girder bridge, concrete substructure, etc., Contr. A-178-1-621, F.A.P. W.P.G.S. 402, Alleghany Co., to G. F. Hazelwood, Cumberland, **$25,073**; single 50 ft. span, steel girder bridge, Contr. F-263-1-521, F.A.P. W.P.G.M. 173-B, Frederick Co., to Consolidated Eng. Co., 20 East Franklin St., Baltimore, **$31,873.** Bids Jan. 21. Noted Jan. 27, C.D.—Jan. 16, E.N.-R.

**Massachusetts**—Commonwealth of Massachusetts, Dpt P. Wks., 100 Nashua St., Boston, constructing temporary bridge over Connecticut River, replacing bridge recently damaged by flood, Holyoke and South Hadley, to Boston Bridge Wks., Inc., Binney St., Cambridge. Noted Mar. 30, C.D.—Apr. 2, E.N.-R.

**Mass., Fall River**—City, T. J. Logan, comr. P. Wks., City Hall, rein.-con., steel bridge over Quechan River, day labor under **W.P.A.** Est. $40,000.

**New Hampshire**—State Hy. Comn., Patriot Bldg., Concord, 122 ft. span, concrete slab I-beam bridge over railroad, Plaistow, Rockingham Co., to Central Constr. Co., 316 Essex St., Lawrence, Mass., **$34,494.** Bids Apr. 2, awarded Apr. 14. Noted Apr. 9, C.D.—Mar. 12, E.N.-R.

**New Hampshire**—State Hy. Dpt., Concord, 2 bridges and approaches, 150 and 180 ft. spans, steel stringer supporting rein.-con. slabs, between Newfields and Newmarket, Rockingham Co., to Lane Constr. Corp., 37 Colony St., Meriden, Conn., **$94,103.** Bids Apr. 9, awarded Apr. 14. Noted Apr. 16 C.D.—Apr. 2, E.N.-R.

**Nevada**—State Hy. Comn., Carson City, constructing concrete, steel underpass and concrete, steel bridge on Alameda and Wells Aves., in Reno, and concrete, steel underpass under Southern Pacific Ry., near Reno, both Washoe Co., to J. F. Knapp, 1401 Park Ave., Oakland, Calif., **$153,351** and **$99,496** respectively. Bids Apr. 15. Noted Mar. 31 and Apr. 8, C.D.—Apr. 9, E.N.-R.

**New York**—Dpt. P. Wks., Albany, bridges in Livingston Co., and in Allegany Co., to Maple City Lumber & Supply Co., Inc., 290 Main St., Hornell, **$97,754** and **$22,592** respectively, est. $106,534 and $28,898 respectively***Wyoming Co., to Mohawk Paving Co., Inc., 688 Prospect Ave., Buffalo, **$59,415*****Delaware Co., to Mid-State Builders, Inc., Utica, **$87,511** est. $110,346***bridges and culverts, in Steuben Co., to Cold Spring Constr. Co., Inc., Akron, **$33,008** est. $45,447. Grand total $240,865. Bids Apr. 7. Noted Apr. 9, C.D.—Apr. 9, E.N.-R., under "Contracts Awarded."

**N. Y., Binghamton**—City, constructing multiple span bridge across Chenango River at Ferry St., to James McGraw Co., Commercial Trust Bldg., Phila., Pa., **$310,457.** **P.W.A.** General contractor awarded contract for 300 tons structural steel and 200 tons arch centers, to Phoenix Bridge Co., Phoenixville, Pa. Bids Mar. 23. Noted Mar. 26, C.D.—Mar. 12, E.N.-R.

**N. Y., Buffalo**—City, City Hall, constructing 2 arch span stone, rein.-con. bridge at Delaware Ave., relief labor; 105 tons reinforcing steel, to Bethlehem Steel Co., Hamburg Turnpike, Lackawanna. **W.P.A.**

**Ohio**—J. J. Jaster, Jr., Hy. dir., Columbus, constructing continuous deck plate girder bridge, concrete abutments, piers and deck slabs over Pennsylvania R.R. at Ward's crossing south of Bedford and grading, draining, brick paving, roadside improvement 0.372 mi. Cuyahoga Co., to W. E. McHugh Co., 3600 Ridge Rd., Cleveland, **$236,939** est. $267,483***constructing concrete bridge continuous steel beams, over Big Walnut Creek at Columbus Airport, and grading, drainage structures, cold mixed widening and paving, Franklin Co., to Cleveland Trinidad Paving Co., 501 Commerce Bldg., Columbus, **$89,464** est. $90,045. Bids Apr. 17. Received no bids Apr. 17, widening existing concrete beam bridge over Ohio Canal, Village of Millersport, Fairfield Co., $6,340. Noted Apr. 13, C.D., under "Streets and Roads."

**Ohio**—See "Streets and Roads."

**Oregon**—See "Streets and Roads."

**Pennsylvania**—See "Streets and Roads."

**Rhode Island**—Seaboard Constr. Co., general contractors, 434 Allens Ave., Providence, and 201 Marginal St., Boston, Mass., 100 tons structural steel for new overpass at North Kingston, to Bethlehem Fabricators, Inc., Bethlehem, Pa., for State, and Providence Plantations, Div. Contracts & Standards, State House, Providence. Noted Apr. 2, C.D.—Apr. 9, E.N.-R., under "Contracts Awarded."

**Tenn., Knoxville**—City, c/o City Clerk, constructing rein.-con. beam and girder bridge to measure from face to face of abutment 556 ft. consisting of 12 spans, West 5th Ave., to H. B. Garrett Co., Knoxville, **$112,504.** Est. $140,000. **P.W.A.** Bids Dec. 13. Noted Dec. 13, C. D.—Dec. 19, E. N.-R.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing G. C. and S. Fe R.R. overpass and roadway, approaches, Hy. 73, Austin Co., to Uvalde Constr. Co., Santa Fe Bldg., Dallas, **$86,025** est. $90,900; constructing P. and S. F. R.R. underpass and approaches, Hy. 117, Lipscomb Co., to Standard Paving Co., 251 Majestic Bldg., Fort Worth, **$50,690** est. $55,000. Bids Apr. 7. New **P.W.A.** Noted Apr. 13, C.D.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing Mex. R.R. overpass and roadway approaches and 2 multiple box culverts on Hys. 66 and 12, Jim Wells Co., to Cage Bros., Bishop, **$137,775** est. $140,000; constructing I. and G. R.R. underpass, roadway approaches and concrete pavement Hy. 21, Houston Co., to L. H. Lacy Co., 3009 North Henderson St., Dallas, **$55,029** est. $60,000. New **P.W.A.** Bids Mar. 24. Noted Mar. 31, C.D.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing T. and N. O. R.R. underpass and approaches Hy. 22, Cherokee Co., to E. Loyd, Box 1077, Fort Worth, **$44,126** est. $50,000; constructing G. C. and S. Fe R.R. underpass and approaches on Hy. 38, Brazoria Co., to Brown & Root, Inc., 708 Colorado St., Austin, **$60,074** est. $65,000. Bids Apr. 8. New **P.W.A.** Noted Apr. 14, C.D.

**Texas**—G. Gilchrist, state hy. engr., Austin, 4 rein.-con. girder bridges on Hy. 1, Hudspeth Co., to Crouch & Noland, Strawn, **$58,102** est. $60,000; constructing Llano River Bridge, Hy. 27, Kimble Co., to Central Bitulithic Co., P. O. Box 5343, Dallas, **$266,547** est. $270,000. Bids Apr. 8. Noted Apr. 14, C.D.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing T. and N. O. R.R. underpass, approaches on Hys. 9 and 12, San Patricio Co., to Briggs-Killian Co., Pharr, **$132,386** est. $140,000; G. C. and S. Fe R.R. underpass and approaches on Hy. "F," Denton Co., to Purvis & Bertram, 112 West 19th St., Fort Worth, **$17,549** est. $20,000. New **P.W.A.** Bids Mar. 25. Noted Apr. 14, C.D.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing C. R. I. and G. R. R. overpass, approaches and concrete pavement Hy. 114, WPGS 835-A, Dallas Co., to R. W. Briggs & Co., Pharr, **$86,094.** Est. $90,000. New **P.W.A.** Bids Mar. 11. Noted Mar. 17, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, constructing 2 rein.-con. bridges on Hy 7, between Gatesville and McLennan, F. A. P. 601-F, Coryell Co., to Word & Worrell, Itasca, **$47,444.** Est. $45,000. Bids Mar. 24. Noted Mar. 30, C. D.

**Vermont**—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, T-beam bridge with gravel approaches on Route 100, Project WPSO 190-A, Duxbury, to Lockwood-Young Corp., 21 Union St., Concord, N. H., **$10,078*****45 ft. span T-beam bridge with gravel approaches on Route 19, Bridgeport, to E. L. Knight, South Royalton, **$7,365*****2 span I-beam bridge on Route 12, East Montpelier, and 80 ft. span I-beam bridge with gravel surface approaches on Route 12, North Montpelier, to M. De Groot, Route 1, Fort Edward, N. Y., **$19,030** and **$12,657** respectively. Grand total $49,130. Bids Apr. 3, awarded Apr. 10. Noted Apr. 9, C.D.

★ **Washington** — Union Pacific Ry., 4th and Jackson Sts., Seattle, bridge and road maintenance on Washington division, incl. steel bridges, two timber bridges near Pullman and third east of Cheney, company forces. $1,500,000. S. Murray, c/o owner, engr.

**Wisconsin**—See "Streets and Roads."

## STREETS AND ROADS

**BIDS ASKED**

**Arkansas**—May 6, by State Hy. Dpt., Little Rock, grading 0.37 mi. rein.-con. structural steel overpass and concrete paving, St. Louis-San Francisco Ry., Imboden Co. $220,000. W. W. Zass, 316 Fern St., Little Rock, engr.

**Arkansas**—May 6, by State Hy. Dpt., Little Rock, grading, drainage, concrete paving 0.7 mi. Sycamore St. N. on 3rd to County Rd. N., Woodruff Co., $40,000; grading, drainage, traffic gravel surfacing 6.3 mi. and constructing untreated timber bridges, south to Clay-Greene Co. line, Clay Co., $40,000; 5.1 mi. Northeast Pocahontas Hy. 67 along County Rd. to Engleberg, Randolph Co., $40,000; 7.3 mi. Walnut St. east along County Rd., Jackson Co., $40,000; 5.2 mi. Emmet Beard Chapel Rd., Hempstead Co., $40,000; grading, drainage, bituminous on gravel surfacing 2.4 mi. Bentonville North Rd., southwest corner Court House Sq., No. E to No. 72, Benton Co., $40,000; grading, drainage, traffic service gravel surfacing 6.6

†*Federal Government*

*Constr. News page 303*

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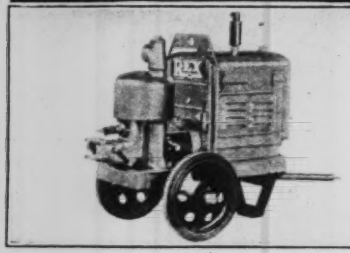

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Streets and Roads (Continued)

mi., east city limits extends east along County Rd., Scott Co., $40,000; grading, drainage structures 8.9 mi. on Hackett Greenwood Rd. Intersection Hys. 45 and 10, Sebastian Co., $60,000. W. W. Zass, 316 Fern St., Little Rock, engr.

**California** — May 13, by State Hy. Comn., Sacramento, applying seal coat on 32.9 mi. hy. and applying oil treatment on portions of hy. between Hot Creek and Cedarville Mountain and between southerly boundary and Alturas, Modoc Co.; grading, asphaltic concrete paving 3.5 mi. hy. between Yolo Causeway and M St. subway, Yolo Co.; grading, plant mixed surfacing, medium curing type 10.3 mi. hy. between Dunnigan and Arbuckle, Yolo and Colusa Counties. C. H. Purcell, P. Wks. Bldg., Sacramento, ch. hy. engr.

†**Calif., Crescent City**—May 13, by P. Wks. Officer, Mare Island, repairing roadway leading from Crescent City to Naval Direction Finder Station, at Point St. George.

**Calif., Stockton**—Y. Smith, 30 South San Joaquin St., taking bids (a) penetration asphaltic on 4 in. cement gravel surfacing (b) plant mix cold mix on 4 in. gravel surfacing (c) asphaltic concrete on gravel stabilized with emulsified asphalt paving Westmoor Subdivision, for Interests, headed by Y. Smith. To exceed $25,000.

**Connecticut**—See "Contracts Awarded."

**Conn., New Britain**—See "Contracts Awarded."

**Idaho**—May 8, by G. E. McKelvey, comr. P. Wks., Boise, drainage structures, crushed rock surfacing 2.897 mi. Arrow-Deary Hy., from Arrow north to Nez Perce Co., incl. 39,000 cu.yd. solid rock and 50,000 cu.yd. common excav., 200 cu.yd. excav. for culverts, 220 cu.yd. excav. for bridge; 5.445 mi. Reubens-Melrose Rd. between Reubens and Melrose, Nez Perce Co., 7,800 cu.yd. solid rock, 65,000 cu.yd. common rock and 370 cu.yd. structural excav.

**Ill., Chicago**—May 5, by Cook Co., G. A. Quinlan, co. supt. Hys., 188 West Randolph St., improving Paving Projects 64, 19, 60A, 60B, 68, 74, 66B, 56, 62, 78, 73, 66A, 18 and 28.

**Ia., Grundy Center**—May 18, by Grundy Co., L. A. Meyer, aud., gravel surfacing 24.5 mi. road. J. W. Wiersma, co. engr.

**Kansas**—May 5, by State Roads Comn., at office of City Clerk, Oakley, bituminous mat surfacing, earthwork, culverts 42.461 mi. hys. in Logan, Norton and Wallace Counties.

**Kentucky**—May 8, by State Hy. Comn., Frankfort, grading, draining 5.358 mi. Columbia-Liberty Rd., W.P.S.O. 379 B-G, Casey Co.; 1.004 mi. Smocks Chapel-St. Rose Rd., W.P.S.O. 280 C-G, Washington Co.; high type surfacing and culvert construction 0.265 mi. Lake St., Fulton, W.P.M.H. 146 E-S, Fulton Co.; low type surfacing 2.303 mi. Sullivan-Boxville Rd., W.P.S.S. 314 B-S, Union Co.

**Louisiana** — May 6, by State Hy. Comn., Baton Rouge, grading, gravel surfacing 6.624 mi. Springhill Southwest Hy., Route C-1434, Project 1143-WPSO 362, Webster Parish; 5.386 mi. Pine Grove-Route 506 Hy., Route C-1436, Project 1148, WPSO 360, St. Helena Parish; 2.825 mi. Ethel-Route 126 Hy., Route 861, Project 971-A, WPSO 269, East Feliciana Parish; 6.793 mi. Loranger-Husser Hy., Routes 407 and 408, Project 979-A WPSO 286, Tangipahoa Parish; 4.846 mi. Stay-Intersection Route 1 Hy., Route C-1426, Project 1124, WPSO 350, Grant Parish; 3.37 mi. Sykes-Olla Hy., Route 990, Project 812-G, WPSO 292, Winn Parish; 6.029 mi. Intersection Route 37-Intersection Route 35, on Route 1223, Project 945-B-2, WPSS 295, St. Helena Parish; 6.978 mi. Campti-Clear Lake Hy., Route 606, Project 870-A, WPSO 355, Natchitoches Parish; 5.257 mi. Jena-Almwell Hy., Route 1010, Project 841-A, WPSO 276, La Salle Parish; 5.127 mi. Intersection Route 225-Intersection Route 90 Hy., Route 792, Project 1021, WPSO 358, Red River Parish; 4.36 mi. Simmsboro-Springhill Church Hy., Route C-1423 and 528, Project 900-A, WPSO 354, Lincoln Parish; grading, local iron ore surfacing 6.827 mi. Conway Church-Quigley Hy., Route 817, Project 929-A, WPSO 361, Union Parish; 5.814 mi. Gibsland-Intersection Route 89 Loop Hy., Routes 565 and 1151, Project 1098, WPSO 348, Bienville Parish; 2.938 mi. Carlton-Pleasant Valley Church Hy., Route C-1424, Project 1120, WPSO 356, Ouchita Parish; 8.607 mi. Eden-Fellowship-Jena Hy., Routes C-1415, C-1416 and C-1417, Project 1107, WPSO 353, La Salle Parish; 5.141 mi. Eros-Indian Village Hy., Route 1303, Project 1159, WPSO 352, Jackson Parish; 8.802 mi. Plain Dealing-Rocky Mount Hy., Route C-1351, Project 349, WPSO 1009, Bossier Parish; 4.917 mi. Columbus Post Office-Negreet Hy., Route 536, Project 1092, WPSO 359, Sabine Parish.

**Maryland** — May 5, by State, Hds. Comn., Baltimore, macadam paving 1.27 mi. Altamont-Bittinger Rd. from end of Contr. G106 toward Bittinger, Fed Aid Project WPSO 373 B, Garrett Co.; 1.76 mi. Churchville-Level Rd. from end Contr. H 127, to Level, Herford Co.; concrete paving 2.95 mi. National Pike from point 0.25 mi. west Conococheague Creek to Huyette Cross Rds., Fed Aid Project WPH 171-A-1, Washington Co.; graveling 0.9 mi. Oakington Rd. relocation, Fed. Aid Project WPGS 405, Harford Co., constructing single 181 ft. span steel arch bridge concrete floor, substructure, over tracks of Baltimore & Ohio R.R. at Rockville, Fed. Aid Project WPGM 401 A, Montgom... State Roads Comn., Federal Reserve Ban...

**Massachusetts**—May 7, by Commonw... Massachusetts, Metropolitan Dist., Wat... ply Comn., R. N. Moll, secy., F. E. ... ch. engr., 20 Somerset St., Boston, grav... in place with refined tar surfacing 1.8 ... Dana and Petersham. To exceed $75,0...

**Mass., Athol**—See "Contracts Awarded."

**Mass., Attleboro**—See "Contracts Awa...

**Mass., Framingham**—See "Contracts Aw...

**Mass., Hatfield**—See "Contracts Awar...

**Mass., Hudson**—See "Contracts Awar...

**Mass., Lowell**—See "Contracts Award...

**Mo., St. Louis**—May 26, by Bd. P. ... City Hall, reconstructing asphalt on ... paving 13th and Pine Sts., $5,240 and ... respectively. P.W.A. project. L. A. Petti... engr.

**Nevada**—May 13 (extended date); by ... Hy. Comn., Carson City, grading, crush... stone or graveling 8.16 mi. road betw... mi. north of Elko and Dinner Station ... Co. R. A. Allen, Heroes Memorial Bldg. ... son City, engr.

**New York**—May 5, by Dpt. P. Wks., A... graveling 4.24 mi. Middaugh Hill Rd., W... 969-A, Alleghany Co.; 4.99 mi. Johns... Meco-Phelps Rd., WPSO-973-A, Fulton ... shale bituminous treated surfacing 3.7... New Hope-Scott Rd., Part 1, Cayuga Co.... crete paving 3.28 mi. Jerusalem Ave. and ... St., Nassau Co.; 3.1 mi. Couse-Luther ... S.H. 583, Rensselaer Co.; adv. E. N.-R., Ap...

**N. Y., Altamont**—See "Contracts Awarded."

**N. Y., Brooklyn**—May 6, by R. V. Ing... pres. Brooklyn Boro, grading, granite ... Berry St.; grading, asphalt on concrete p... Monroe Pl., Quentin Rd., Washington, L... ton and Bath Aves., Henry, Orange, 5th, ... and West 13th Sts.

**N. Y., Cooperstown**—See "Contracts Awarded."

**N. Y., Cortland**—See "Contracts Awarded."

**N. Y., Endicott**—See "Contracts Awarded."

**N. Y., Ithaca**—May 26, by Dpt. Health, State Office Bldg., Albany, roads, walks, grading at Biggs Memorial Hospital. $41,200. T. F. Farrell, Albany, state hy. engr.

**N. Y., New York**—May 12, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing roadway and miscellaneous work at Jamaica Yard.

**N. Y., Ogden**—See "Contracts Awarded."

**N. Y., Rome**—See "Contracts Awarded."

**N. Y., Owego**—See "Contracts Awarded."

**N. Y., Sweden**—See "Contracts Awarded."

**N. Y., Tonawanda**—See "Contracts Awarded."

**N. Y., Wilson**—See "Contracts Awarded."

**Ohio**—May 5, by J. J. Jaster, Jr., state hy. dir., Columbus, drainage structures, grading, brick paving 0.104 mi., constructing stone fill spandrel filled concrete arch bridge, CU 154, over branch of Euclid Creek, roadside improvement State Hy. 446, State Route 175, Richmond Heights Village, Cuyahoga Co. ... 729.

**Pennsylvania** — May 8, by W. Van Dyke, secy. Hys., Harrisburg, grading, drainage 5.367 ft. R. 18004, Sect. 2, Clinton Co., incl. ... cu.yd. excav.; 7,000 ft. R. 18012, Sect. ... Clinton Co., 88 cu.yd. excav.; 4,738 ft. R. 26428, Fayette and Westmoreland Counties, ... cu.yd. excav.; 11,090 ft. R. 62048, R. 62050, Washington Co., 375 cu.yd. excav.; 15,748 ft. R. 66101, R. 66149, York Co., 380 cu.yd. excav.; bituminous surfacing, native stone base 3.001 ft. R. 19001, Sect. 1, Columbia Co., 7,041 cu.yd. excav.; rein.-con. paving two 10 ft. outside lanes, one bituminous surfacing 10 ft. center lane and constructing two rein.-con. structures 12,934 ft. R. 131, Sect. 11, Delaware Co., 73,567 cu.yd. excav.; grading, drainage 24,108 ft. extending existing rein.-con. structures R. 88, Sect. 6, Erie Co., 72,738 cu.yd. excav.; constructing 5,783 ft. encased I-beam overpass bridge, rein.-con. paving and rein.-con. arch R. 148, Lancaster Co., 66,903 cu.yd. excav.; rein.-con. paving two 10 ft. center lanes and bituminous surfacing two outside lanes, constructing three rein.-con. structures, 20,850 ft. R. 161, Sect. 9, Northumberland Co., 94,134 cu.yd. excav.

★ **South Carolina**—May 5, by State Hy. Dpt., Columbia, earth grading 7.266 mi. U. S. Route 15, W.P.H. 359-E, Sumter Co., involving 19,700 cu.yd. excav., $18,000; earth grading and bridging 13.76 mi. Route 51, W.P.S.S. 414-A and W.P.S.S. 414-B, Georgetown Co., 71,000 cu.yd. excav., $57,000; 4.761 mi. Route 57, W.P.S.S. 438, Marion Co., 70,000 cu.yd. excav., $46,000; earth type surfacing 3.792 mi. Route 73, W.P.M.S. 427-A and W.P.S.S. 427-B, Dillon Co., 47,000 cu.yd. excav., etc., $37,000; 9.543 mi. Route 101, W.P.S.S. 398-B, Spartanburg Co., 124,700 cu.yd. excav., etc., $87,000; 0.384 mi. Route 101, W.P.G.S. 398-C, Spartanburg Co., 41,350 cu.yd. excav., etc., $25,000; 1.835 mi. hy. W.P.S.O. 433, Edgefield Co., 17,000 cu.yd. excav., etc., $13,000; 3.523 mi. County Rd., W.P.S.O. 432, Fairfield Co., 41,000 cu.yd. excav., etc., $24,000; 2.135 mi. County Rd., W.P.M.S. 439-A and B and W.P.S.O. 439-C and D, Anderson, Abbeville and Greenwood Counties, 46,000 cu.yd. excav., etc.,

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†*Federal Government*

Streets and Roads (Continued)

$52,000; 3.106 mi. Route 18, W.P.M.H. 322, Anderson Co., 44,300 cu.yd. excav., etc., $32,000; 5.75 mi. County Rd., W.P.S.O. 416-A, Lexington Co., 73,000 cu.yd. excav., etc., $53,000; 3.251 mi. County Rd., W.P.S.O. 416-B, Lexington and Saluda Counties, 44,800 cu.yd. excav., etc., $33,000; 6.515 mi. Route 31, W.P.H. 536-B, Calhoun Co., 59,600 cu.yd. excav., etc., $39,000; 3.86 mi. County Rd., W.P.M.S. 430 and W.P.S.O. 430, Barnwell Co., 36,000 cu.yd. excav., etc., $29,000; 1.579 mi. County Rd., W.P.S.O. 429, Newberry Co., 31,000 cu.yd. excav., etc., $24,000; earth type surfacing, bridging 2.85 mi. Route 33, W.P.H. 8, Bamberg Co., 48,600 cu.yd. excav., etc., $38,000; 2.336 mi. Route 265, W.P.S.S. 435 and W.P.M.S. 435, Chesterfield Co., 56,000 cu.yd. excav., etc., $43,000; grading, bridging 3.067 mi. County Rd., W.P.M.S. 442 and W.P.S.O. 442, Jasper Co., 27,700 cu.yd. excav., etc., $24,000; 4.132 mi. County Rd., W.P.S.O. 417, Oconee Co., 104,000 cu.yd. excav., etc., $60,000; bituminous surfacing 5.727 mi., Route 47, State Project 861, Orangeburg Co., 63,000 cu.yd. excav., etc., $53,000; 0.338 mi. Route 7, N.R.M. 310-D, and N.R.H. 310-E, (1935), Newberry Co., 4,600 cu.yd. excav., etc., $11,000; bituminous surfacing, structure 1.91 mi. Route 14, W.P.S.S. 76-A Ext. and W.P.S.S. 76-A, Sects. 1 and 2, Pickens Co., 49,000 cu.yd. excav., $52,000; 6.113 mi. Route 82, Projects N.R.S. 389-A, Contr. 2 and N.R.S. 389-B, Parts 1 and 2, Anderson and Abbeville Counties, $18,000; 4.283 mi. County Rd., W.P.S.O. 395-B, Clarendon Co., 51,800 cu.yd. excav., $58,000; concrete paving 0.138 mi. Route 76, N.R.H. 75, Oconee Co., $3,000.

**S. C., Greenville**—May 5, at office of Secretary Bd. Comrs. Greenville Co., patching and bituminous retreatment 104.5 mi. and reconstructing 0.2 mi., involving 350 cu.yd. unclassified excav., 350 cu.yd. earth type base, 700 cu.yd. half mile overhaul, 23,390 sq.yd. 60 lb. bituminous retreatment, 2,320 tons additional aggregate, 39,700 gal. additional cutback asphalt, 0.6 mi. MLF mixing, shaping, etc. D. B. Aull, Jr., Greenville, co. engr.

**Utah**—May 7, by State Rd. Comn., Salt Lake City, grading, draining, gravel surfacing 1.931 mi. state highway from Garden City S., Rich Co., incl. 17,500 cu.yd. unclassified excav. K. C. Wright, state road engr.

**Vt., Rutland**—See "Contracts Awarded."

**Wisconsin**—May 5, by State Hy. Comn., at Division Office, Hoeschler Bldg., La Crosse, crushed stone surfacing 6.5 mi. Melvina-Leon Rd., State Trunk Hy. 27, A.F.E. 41-31; shale base course 2.2 mi. Sparta-Melrose Rd., State Trunk Hy. 71, A.F.E. 41-33, both Monroe Co.; applying 144,000 gal. bituminous material for skin mat work, A.F.E. 4-37, 6-38, 6-39, Buffalo Co., 120,000 gal. A.F.E. 27-32, 27-33, Jackson Co.

**Wisconsin**—May 8, by State Hy. Comn., at office Division Engineer, 513 Commerce Bldg., Milwaukee, applying 88,000 gal. bituminous material for skin mat work, A.F.E. 30-18, 30-19, Kenosha Co.; 90,000 gal. A.F.E. 66-29, 66-30, Washington Co.; 70,000 gal. bituminous material turn over work, A.F.E. 64-19, Walworth Co.; 96,000 gal. A.F.E. 66-27, Washington Co.; 20,000 gal. bituminous material for seal coat work, A.F.E. 64-20, Walworth Co.

**Wisconsin**—May 8, by State Hy. Comn., at office State Office Bldg., Madison, grading, draining, concrete surfacing 6.325 mi. Wisconsin Dells Wisconsin Rapids Rd., Easton-Adams Rd. and Wisconsin Dells Easton Rd., State Trunk Hy. 13, Fed. Aid Project 54 Re. and 394-C Re., 279 Re., Adams Co., incl. 74,595 cu.yd. common, borrow, marsh excav.; grading, concrete surfacing 7.408 mi. New Lisbon Sparta Rd., U. S. Hy. 16, Fed. Aid Project 325 A and B, State Project 5486, Monroe Co., 19,957 cu.yd. common, borrow, fine grading excav.; concrete surfacing 7.391 mi. Whitehall Ettrick Rd., U. S. Hy. 53, Fed. Aid Project 120 A and B, Trempealeau Co., 7,724 cu.yd. borrow excav., 11.318 mi. St. Croix Falls Superior Rd., Milltown Frederic Rd., State Trunk Hy. 35, Fed. Aid Project 407-G (1, 2, 3), 265-C, Polk Co.; gravel surfacing 6.336 mi. Manitowoc Chilton Rd. West County Line Valders Rd., U. S. Hy. 151, Fed. Aid Project 474, Manitowoc Co.; top soil base course gravel surfacing 7.037 mi. Montello East County Line Rd., State Trunk Hy. 23, Fed. Aid Project 609 A and B, Marquette Co.; Gravel or crushed stone surfacing 6.173 mi. Elroy New Lisbon Rd., State Trunk Hy. 80, U. S. Wks. Project WPSS 605-A, WPMS 605-B, Juneau Co.; grading, furnishing, placing roadside treatment materials, gravel surfacing 0.096 mi. Milwaukee Sheboygan Manitowoc Rd. Pigeon River Wayside Park Rd., U. S. Hy. 141, U. S. Wks. Project WPMH 420-B, Sheboygan Co., 2.493 cu.yd. common and borrow excav.; grading, draining 6.336 mi. Manitowoc Chilton Rd. West County Line Valders Rd., U. S. Hy. 151, Fed. Aid Project 474, Manitowoc Co.; 6.034 mi. Montello East County Line Rd., State Trunk Hy. 23, Fed. Aid Project 609-B, Marquette Co., 153,186 cu.yd. common, borrow and marsh excav.; 2.077 mi. Prentice Ashland Rd. Fifield Ashland County Line Rd., State Trunk Hy. 13, U. S. Wks. Project WPH 405-C, Price Co., 105,410 cu.yd. common, borrow excav.; 5.577 mi. Prentice Clifford McCord Rhinelander Rd. McCord Heafford Junction Rd., U. S. Hy. 8, Fed. Aid Project 335-A, 335-D, Sects. 1 and 2, Lincoln Co., 196,832 cu.yd. common and marsh excav.; 4.413 mi. Cameron Ladysmith Rd. Bruce Ladysmith Rd., U. S. Hy. 8, Fed. Aid Project 240-C, Rusk Co., 55,556 cu.yd. borrow and marsh excav.; grading, draining, gravel surfacing 0.606 mi. Warren and Jennings Sts., New London City Streets, U. S. Wks. Project WPMS 718, Waupaca Co., 3,147 cu.yd. common excav.; reconstructing deck of viaduct and approaches 0.542 mi. Milwaukee Chicago Rd., Twenty-seventh St. Viaduct, U. E. Hy. 41, U. S. Wks. Project WPMH 378-H, Milwaukee Co.; constructing one 69 ft. I-beam span Bridge 211, one 50 ft. I-beam span Bridge 210, four rein.-con. culverts, Manitowoc Chilton Rd. West County Line Valders Rd., U. S. Hy. 151, Fed. Aid Project 474-B, Manitowoc Co.; constructing one 228 ft. high truss structure, Wheeler Norton Rd. Bridge 168, County Trunk Hy. G, U. S. Wks. Project WPSO 664, Dunn Co.

**Man., Winnipeg**—See "Contracts Awarded."

## CONTRACTS AWARDED

†**Arizona**—Bureau Reclamation, Yuma, surface treatment on highway, Spec. 773-D, to R. E. Hazard & Co., 2547 Kettner Blvd., San Diego, Calif., $5,045. Bids Mar. 30.

**California**—C. R. Whitmore, dist. engr. State Hy. Comn., 703-B St., Marysville, applying penetration oil treatment on 36.7 mi. hys. in Colusa, Butte, Yolo, and Eldorado Counties, to L. J. Immel, 1031 Evelyn St., Berkeley, $8,501. Bids Apr. 13. Noted Apr. 20, C.D.

**California**—J. H. Skeggs, dist. engr. State Hy. Comn., State Bldg., San Francisco, oil treatment involving 425 tons type SC-2, liquid asphalt on 17.9 mi. hy. between point 1 mi. east of Alum Rock Rd. and Mt. Hamilton Observatory, Santa Clara Co., to Pacific Truck Service Co., 646 Park Ave., San Jose, $5,415. Bids Apr. 13. Noted Apr. 8, C.D.

**Colorado**—State Hy. Dpt., Denver, gravel surfacing 1.87 mi. hy. between Gunnison and Cimarron, on State Hy. 6, Gunnison Co., to C. A. Switzer, Arvada, $112,241. Bids Apr. 7, awarded Apr. 13. Noted Apr. 13, C. D.

★**Connecticut**—Following towns, rebuilding, repairing various streets, including much filling, rein.-con., bituminous macadam, asphalt surfacing, gravel roads, patching, etc., in Plainfield, $50,125; Eastford, $31,870; Ashford, $19,250; Killingly, $15,800; Windham, $27,540; Andover, $16,645; Middletown, $217,500; Plymouth, $32,650; New Milford, $67,500; Rocky Hill, $8,437; Plainville, $3,375; East Hartford, $34,700; East Windsor, $16,875; Putnam, $18,125; Pomfret, $29,925; Canterbury, $47,250; Brooklyn, $26,375; Coventry, $32,750; Mansfield, $66,340; Norfolk, $30,800; Watertown, $68,530; Glastonbury, $17,500; Windsor, $42,187; Berlin, $16,875; Windsor Locks, $8,437; Wethersfield, $23,750, damaged by flood, W.P.A. labor. Grand total $971,111. M. A. Daly, Works Progress Administrator, New Haven.

**Connecticut**—Following towns, constructing sidewalks in East Windsor, $787; Wethersfield, $1,890; East Hartford, $15,120; Windsor Locks, $3,150; Watertown, $1,575; Thomaston, $378; Windham, $6,300; Brooklyn, $787; Killingly, $2,362; Thompson, $3,150; Putnam, $1,575; curbs and gutters in Wethersfield, $14,592, damaged by flood, relief labor. Grand total $51,666. M. A. Daly, Works Progress Administrator, 1044 Chapel St., New Haven.

**Conn., New Britain**—City, all sidewalk construction for 1 year, to N. Bellini, Seymour St. Est. exceeds $25,000. G. Molleur, City Hall, engr.

**Conn., New Britain**—City, grading and improving Blake Ave. from Stanley St. to Farmington Ave. W.P.A. labor. Est. $28,000. Owner builds. G. Molleur, City Hall, engr.

**D. C., Wash.**—District Comrs., District Bldg., improving Connecticut Ave., to Corson & Gruman, 33rd and K Sts., $129,437. Bids Apr. 17. Noted Apr. 7, C. D.

**Ill., Alton**—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 0.3816 mi. Sect. 2-C.S., to A. M. Kilgo, Alton, $30,207; 0.3631 mi. Sect. 4-C.S., to Madison Constr. Co., Edwardsville, $31,801. Bids Dec. 4.

**Ill., East Alton**—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving and widening 0.7327 mi. Sect. 2-C.S., in East Alton, to A. M. Kilgo, Alton, $33,785. Bids Dec. 30.

**Ill., Kankakee**—Dpt. P. Wks. & Buildings, Div. Hys., traffic bound surface course paving 2.5568 mi. Sect. 52-MFT, and 1.9867 mi. Sect. 53-MFT roads in Kankakee Co., to Triangle Constr. Co., Kankakee, $14,391 and $11,767 respectively. Bids Mar. 20.

**Indiana**—State Hy. Comn., Indianapolis, rein.-con. paving 3.758 mi. road in Madison Co., to J. R. Hiatt Co., 40 East 54th St., Indianapolis, $135,247. Est. $157,417. Bids Dec. 17. Noted Dec. 3, C. D.—Dec. 5, E. N.-R.

**Iowa**—State Hy. Dpt., Ames, to McKenzie & Holm, Inc., Waterloo, concrete paving 3.212 mi. Bremer Co., $86,554*** to F. Carlson Co., Decorah, 1.478 mi. Franklin Co., $35,468*** to Anderson & Empie, Marshalltown, 0.326 mi. Franklin and Hardin Counties, $11,203; 0.303 mi. Hardin Co., $10,820*** to Moran & Kennedy, 2123 South 56th St., Omaha, Neb., 0.334 mi. Fremont Co., $11,351*** to Haegg Constr. Co., Cedar Rapids, 0.386 mi. Linn Co., $15,720 *** to Booth & Olson, Sioux City, 0.417 mi.

†*Federal Government*

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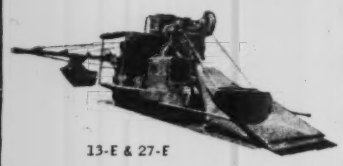

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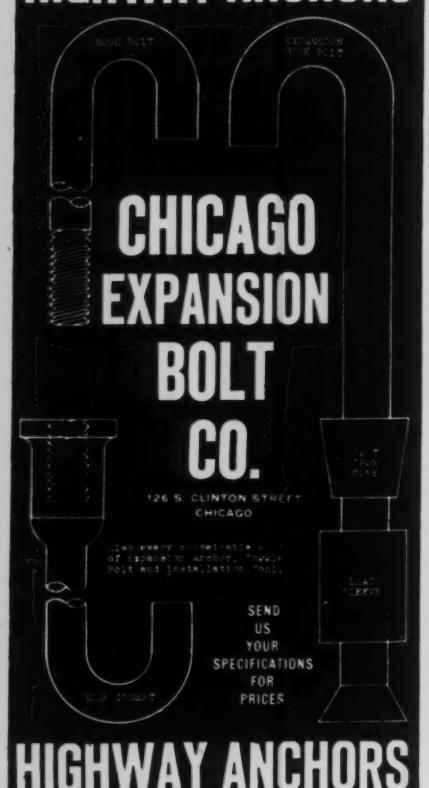

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HIGHWAY ANCHORS

Streets and Roads (Continued)

Palo Alto Co., **$12,777*****to B. C. Johnson, Cedar Rapids, 0.464 mi. Black Hawk Co., **$34,540*****to Western Asphalt Paving Corp., Sioux City, 0.459 mi. Hamilton Co., **$21,283;** 7.465 mi. Lyon and Osceola Counties, **$8,839*****to J. B. Hannahs, West Point, 0.255 mi. Louisa Co., **$13,646*****to Snyder & Johnson, Inc., Humboldt, 0.055 mi. Polk Co., **$5,580*****to J. Schumacher, Bancroft, graveling 5.449 mi. Audubon Co., **$5,328;** 4.903 mi. Fremont and Mills Counties, **$10,940*****to Concrete Materials Corp., Waterloo, 4.171 mi. Clark Co., **$5,336;** 0.459 mi. Hamilton Co., **$807;** 14.616 mi. Hamilton and Hardin Counties, **$27,117;** 1.958 mi. Hardin Co., **$3,634;** 3.444 mi. Johnson Co., **$8,210.** Grand total $329,153. Bids Apr. 14, awarded Apr. 18. Noted Apr. 20, C. D.—Apr. 9, E. N.-R.

**Ia., Mason City**—Cerro Gordo Co., graveling 23.5 mi. road, to H. C. Young, Prairie City, **$13,051*****grading, to B. N. Dilts, Swaledale, **$21,494*****grading, to E. M. Duesenberg, Mason City, **$27,731.** Grand total $62,276. Bids Apr. 9. Noted Mar. 30, C. D.—Apr. 2, E. N.-R.

**Kansas**—State Hy. Comn., at office County Clerk, Hays, earthwork, culverts 6.217 mi. WPSO 442, Decatur and Norton Counties, and 0.637 mi. WPMS 552, Decatur Co., to A. L. Cook, Ottawa, **$57,564** and **$8,349** respectively ***light type surfacing 6.217 mi. WPSO 552, Decatur and Norton Counties and 0.637 mi. WPMS 552, Decatur Co., to D. G. Hansen, Logan, **$12,915** and **$1,327** respectively***earthwork and concrete pavement 0.377 mi. P. 40S-10-WPMH 388 D, Ellis Co., to San Ore Constr. Co., McPherson, **$33,315*****sand graveling for cover material 2 mi. P. 40S-10-6722, Ellis Co., to D. M. Hardman, Alton, **$537*****6.4 mi. P. 40S-11-6733, Ellis Co., to C. Hulme, Great Bend, **$1,310.** Grand total $115,347. Bids Apr. 10. Noted Mar. 27, C.D.—Apr. 2, E.N.-R.

†**Md., Cheltenham** — Yards & Docks, Navy Dpt., Wash., D. C., road and bridge at Naval Receiving Station, Spec. 8169, to J. A. Lavezza & Sons, 130 South Exeter St., Baltimore, **$17,683.** Noted Apr. 21, C.D.

**Massachusetts**—Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston, bituminous concrete sidewalks, incidental work, 9,750 ft., Projects N.R.M. 251-B and N.R.H. 251-A (part), Boston and Dedham, to M. De Matteo, 55 Stella Rd., Roslindale, **$29,299.** Bids Mar. 24. Noted Apr. 3, C. D.

**Mass., Athol**—Town, T. F. Mathews, W.P.A. dist. mgr., Elm St., Fitchburg, D. Higgins, local agt., Town Hall, bituminous macadam and graveling farm-to-market roads, day labor, $55,000. Owner purchases materials.

**Mass., Athol**—Town, W. C. Karner, chn. Bd. Selectmen, J. G. Cotton, supt. Streets, Town Hall, rebuilding bituminous macadam hys. and concrete sidewalks, destroyed by flood, day labor. Est. $30,000.

**Mass., Attleboro**—City, R. G. Mawney, agt., City Hall, penetration macadam paving North Main St., day labor under **W.P.A.** Est. $20,000 to $25,000. Owner purchases materials.

**Mass., Framingham**—Town, T. A. Coyne, supt. Bd. P. Wks., S. Dyer, engr., bituminous macadam paving Edmonds and Wayside Inn Rd., farm-to-market road, $20,000; bituminous macadam hy. and concrete walks and curb, Dennison and Warren Aves., $32,700; Wheeler Ave., $3,200; concrete walks in Beacon St., $8,200; Waverly St., $11,900; Lincoln St., $3,500; Concord St., $13,200; Beaver St. and Kendall Ave., $23,800; Arlington St., $10,500; Waverly St. W., $17,400; clay pipe drains Bishop and Arthur Sts., $5,900, day labor under **W.P.A.** Grand total $151,900.

**Mass., Hatfield**—Town, V. H. Keller, clk., Town Hall, rebuilding macadam surface with gravel base, Bradstreet Rd., destroyed by flood, day labor. Est. $25,000.

**Mass., Hudson**—Town, E. Morgan, supt. Streets, J. H. Kane, W.P.A. agt., Town Hall, bituminous macadam and graveling roads, Chestnut St. and River Rd., day labor. Est. about $25,000.

**Mass., Lowell**—City, G. P. La Grand, supt. Streets, City Hall, bituminous macadam resurfacing Varnum Ave. and Riverside St., $19,500; Dunbar Ave. and Magnolia St., etc., $23,000; Lakeview Ave., $60,000***sidewalks and curbing Pawtucketville Blvd., $115,000; Ellis and Third Ave., $34,000***gravel resurfacing Conduit St. and Sterling Ave., $19,300, day labor. Grand total $270,800. **W.P.A.**

**Missouri**—State Hy. Dpt., Jefferson City, to R. Zink, Appleton, chat haul surfacing 3.007 mi. Golden City-South Greenfield Rd., Sect. 15B, **$3,407;** 2.528 mi. Sect. 16A, same road, **$3,244;** 2.631 mi. Sect. 17C, same road, **$2,065;** 2.779 mi. Sect. 20, same road, **$4,425;** 1.996 mi. Sect. 14C, same road, **$2,087,** all foregoing Dade Co.; 4.5292 mi. road in Linn Co., **$3,844;** 2.527 mi. Route 5-Cooper Co. Rd., Sect. 1, **$13,827;** 3.363 mi. Sect. 2, same road, **$17,316,** both Pettis Co.***to J. A. Kerr, Ozark, 4.583 mi. Newburg-Thox Rock Rd., Sect. 1A, **$4,062;** 4.412 mi. Sect. 2A, same road, **$3,912** ***to O. W. Knutson, 3520 Main St., Kansas City, 0.412 mi. Clay Co., **$5,781*****to F. T. O'Dell, Hannibal, 0.973 mi. Route A to Des-Loge Rd., St. Francois Co., **$8,596.** Grand total $72,566. Bids Apr. 10. Rejected bids Apr. 10, improving road in Greene Co. Noted Apr. 16, C. D.—Apr. 2, E. N.-R.

**Nevada**—State Hy. Comn., Carson City, asphaltic road mix surfacing 24.21 mi. Nye Co., to F. French, Jr., Box 107, Stockton, **$32,813;** crushed gravel or stone surfacing mi. Nye Co., to Dodge Constr. Co., **$7,410.** Bids Apr. 15. Noted Apr. 2, Apr. 9, E.N.-R.

★**New York**—Dpt. P. Wks., Albany, ing 3.84 mi. road in Rensselaer Co., leher Corp., Turners Falls, Mass., $66,[illegible] 5.96 mi. in Clinton and 5.25 mi. Frank[illegible] to Belmar Contg. Co., Inc., Proctor Bldg., **$65,844** and **$69,211** respectively***[illegible] Washington Co., to Troy Paving Co., [illegible] Falls, **$71,042*****4.91 mi. Lewis Co., [illegible] Bros. Contg. Corp., Herkimer, **$38,732*****[illegible] mi. Allegany Co., to L. J. O'Laughlin, [illegible] manca, **$47,234** est. $64,775***2.52 mi. [illegible] selaer Co., to H. G. Scroeder, 718 Mer[illegible] Bldg., Rochester, **$137,168** est. $156,454, total $495,954. Bids Apr. 14. Withdrew bids to have been opened Apr. 14, improving [illegible] in Cattaraugus Co., and bridge in Schen[illegible] Co. Bids Apr. 14. Noted Mar. 26, [illegible] Apr. 2, E. N.-R.

**New York**—State Dpt. P. Wks., Albany, proving 4.47 mi. road in Wyoming Co., [illegible] Mohawk Paving Co., Inc., 688 Prospect [illegible] Buffalo, **$59,415*****4.74 mi. Chemung Co., Holleran Bros., 901 Linden Ave., Elmira, **$61,010*****3.65 mi. Albany Co., to E. F. Dei[illegible] & Co., New Hartford, **$55,709.** Grand total $[illegible] 164. Bids Apr. 7. Withdrew bids to have been opened Apr. 7, roadside improvement Livingston and Ontario Counties, $30,[illegible] Noted Apr. 9, C. D.—Mar. 26, E. N.-R.

**N. Y., Altamont**—Village, grading, [illegible] asphaltic macadam and stone surfacing [illegible] Big Wolf Rd., relief labor. **W.P.A.** Est. about $23,000. J. F. Leeds, South St. School, Glens Falls, procurement officer W.P.A., will purchase materials.

**N. Y., Cooperstown**—Bd. Supervs. Otsego Co., constructing and reconstructing county highways, own forces. To exceed $23,000. $35,[illegible] allotted from state gasoline tax. Will soon purchase construction and maintenance materials.

**N. Y., Cortland**—Bd. Supervs. Cortland Co., constructing and reconstructing county highways, own forces. $25,000. $15,558 allotted from state gasoline tax. Will soon purchase construction and maintenance materials.

**N. Y., Endicott**—Village, E. W. Travis, mayor, paving Main and North Sts., own forces. To exceed $25,000. Owner purchases materials.

**N. Y., Long Island City**—G. U. Harvey, pres., Queens Boro, Queens Subway Bldg., to Palmo Constr. Co., 105-22 101st Ave., Ozone Park, regulating 218th St., **$6,709;** 75th St., **$4,462;** 144th St., **$7,804*****to W. C. Reediger, 2[illegible] 45th St., 144th St. **$3,837*****to Brugel Contr. Co., 77-06 Cypress Ave., Ridgewood, 164th St. **$1,339*****to Speiza Contg. Co., 139-32 231st St., Laurelton, Rockaway Beach Blvd., $930. Grand total $25,081. Bids Mar. 30. Noted Mar. 31, C. D.

**N. Y., Ogden** — Bd. Supervs. Monroe Co. County Bldg., Rochester, bituminous macadam paving Covell and Euler Rds., relief labor, $84,489. **W.P.A.** A. Hackett, 1460 South Ave., Rochester, procurement officer W.P.A., will purchase materials.

**N. Y., Owego**—Bd. Supervs. Tioga Co., constructing and reconstructing county highways, own forces. To exceed $25,000. $16,554 allotted by state. Will soon purchase construction and maintenance materials.

**N. Y., Rome**—Oneida Co., field stone and gravel road 2.38 mi. Shean Rd., Annsville, $18,700; 1.17 mi. Mix Rd., Camden, $7,100; graveling 3.02 mi. Burns Rd., Augusta and Vernon, $16,800; 2.8 mi. Townline Rd., in Vernon, Verona and Westmoreland, $13,100; graveling and widening 2.18 mi. Ava-Boonville Rd., Ava., $7,600; 4.55 mi. Homan City Rd., Bridgewater and Paris, $22,500; 3.52 mi. Crooked Brook Rd., Deerfield, $15,700; 3.78 mi. Florence-Redfield Rd., Florence, $20,600; 2.69 mi. Hawkins Corners-Lee Center Rd., Lee, $14,000; 4.17 mi. Whitestown Rd., Marcy, $18,000; 1.24 mi. Oxford Rd., New Hartford, $14,200; 2.3 mi. Buck Hill Rd., Western, $14,600; Dustin Rd., Forestport, $6,000; About Rd., Kirkland, $4,000; Coates Rd., Trenton, $5,000; Senn Rd., Vernon, $8,800; bituminous on gravel surfacing 0.64 mi. Oriskany Monument Rd., Rome and Whitestown, $5,700; 1.7 mi. East Boonville Rd., Boonville, $15,400; 2.36 mi. Norton Ave., Kirkland and Westmoreland, $20,900; 1.03 mi. Cleveland Corners Rd., Rome, $7,400; 4.15 mi. Coombs Rd., Trenton and Marcy, $18,200; 2.22 mi. North Bay Rd., Vienna, $11,800; 0.93 mi. Marshall Station Rd., Marshall, $6,100, own forces. Grand total $292,200.

**N. Y., Sweden**—Monroe Co., County Bldg., Rochester, bituminous macadam paving Whittier St., relief labor. $49,600. **W.P.A.** A. Hackett, 1460 South Ave., Rochester, procurement officer W.P.A., will purchase materials.

**N. Y., Tonawanda**—Town of Tonawanda and Village of North Tonawanda, repairing and resurfacing with macadam Tonawanda, Delaware, East Niagara, Sweeney and East Robinson Sts., by own forces, under supervision of H. Bluckhorn, supt. P. Wks. To exceed $23,000.

**N. Y., Wilson**—Village, Village Hall, bituminous macadam paving 1.5 mi. McChesney Harbor, Ontario and Pettit Sts., relief labor, to exceed $23,000. **W.P.A.** E. Noonan, Bailey Bldg., Lockport, procurement officer W.P.A., will purchase materials.

**Ohio**—J. J. Jaster, Jr., state hy. dir., Columbus, grading, drainage structures, traffic bound surface course paving 1.781 mi., constructing

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†*Federal Government*

Streets and Roads (Continued)

creosoted timber bridge on steel beams on Muskingum Water Shed Conservancy District Project, Bridge W1-MU-3A over Big Run and creosoted timber bridge on steel beams on Muskingum Water Shed Conservancy Project W1-MU-8B over Brelsford Run on parts of County Rds. 14 and 431, Muskingum Co., to J. Shidecker, 936 Elsworth Ave., Columbus, $19,256. Noted Apr. 2, C. D.

**Ohio**—J. Jaster, Jr., Hy. dir., Columbus, drainage structures, relaying brick surface, hot mixed resurfacing, 0.565 mi. Muskingum Co., to Muskingum Valley Asphalt & Supply Co., 410 Pearl St., Zanesville, **$20,329*****grading, drainage structures, brick paving, roadside improvement 2.18 mi. Hamilton Co., to W. L. Johnson Constr. Co., Hicksville, **$395,006***** grading, drainage structures, cold mix cold laid asphaltic paving, roadside improvement 1.991 mi. Hardin Co., to Churchill, Inc., 835 East North St., Lima, **$69,994.** Grand total $485,329. Bids Apr. 17. Noted Apr. 13, C.D.

**O., Cincinnati**—Hamilton Co., to L. P. Cavett Co., 501 Shepherd Rd., Lockland, surface treatment 80 mi. various roads in Eastern and Cheviot Divsions, **$37,440** est. $38,310; 50 mi. various roads in Western Division, **$22,570** est. $23,095; 50 mi. various roads in Woodlawn Division, **$22,570** est. $23,095. Grand total $82,580. E. A. Gast, Court House, engr. Noted Mar. 27, C. D.—Apr. 2, E. N.-R.

**Oregon** — State Hy. Comn., Salem, grading 6.83 mi. Agency Plains Madras Sect. Warm Spring Hy., Jefferson Co., to J. Crick, N3104 Monroe St., Spokane, Wash., **$67,285*****grading 1.5 mi. surfacing 6.2 mi. Toledo Simpson Creek Sect. and approaches to Yaquina Bay Bridge, Lincoln Co., to Consolidated Hy. Co., Portland, **$104,320** and **$75,847** respectively*** concrete overcrossing over Union Pacific R.R. near Madras, Jefferson Co., to McNutt Bros., Eugene, **$16,576*****overcrossing over Southern Pacific R.R., south of Roseburg, Douglas Co., to Mountain State Constr. Co., Eugene, **$32,760** ***grading, surfacing 8 mi. Reedsport Wilson Ranch Sect. Umpqua Hy., Douglas Co., to Warren Northwest Co., Portland, **$63,753.** Grand total $360,541. Bids Apr. 16. Noted Apr. 7, C. D.

**Oregon**—State Hy. Comn., Salem, oiling 11.16 mi. Mist Pittsburgh Sect. Nehalem Hy., Columbia Co., to Babler Bros., Portland, **$24,052***** resurfacing 11.16 mi. same road, to Saxton & Looney, Portland, **$27,194*****oiling 22.49 mi. Elgin Rock Creek Sect., Union and Wallowa Counties, to H. Blake, Portland, **$33,675***** windbreak planting 5.19 mi. Hot Lake La Grande Sect., Union Co., to Hart Constr. Co., La Grande, **$3,742*****undercrossing Oregon Trunk Ry., Deschutes Co., to P. L. Crookes & Co., Portland, **$76,476*****undercrossing in Oregon City, Clackamas Co., to Parker & Schramm, Portland, **$289,416.** Grand total $457,555. Bids Apr. 17. Rejected bids Apr. 17, surfacing 17 mi. Crook Sect. Dalles Durfur Rd., Wasco Co. Low bidders not yet awarded for resurfacing, oiling 7 mi. Balm Grove Forest Grove Sect. Gales Creek Rd. from Saxton, Looney, Risley, Portland, and F. C. Compton, McMinnville, **$56,430;** paving 0.48 mi. Vancouver Ave. extension Columbia Blvd. to Union Ave., Muttnomah Co., from H. Blake, Portland, **$21,376.** Noted Apr. 8, C.D.

★ **Pennsylvania**—Dpt. Hys., Harrisburg, rein.-con. paving 1.08 mi., incl. rein.-con. gusset, Allegheny Co., to Conte Eastwood, Inc., 9000 Frankstown Rd., Pittsburgh, **$74,820***** rein.-con. paving 2.53 mi. Allegheny Co., to A. G. Sauer & H. F. Larry, Wexford, **$313,965** ***rein.-con. rigid frame overpass 0.25 mi. Erie Co., to M. H. Parish Co., 614 Plaza Bldg., Pittsburgh, **$67,277*****240 ft. fabrication and erection deck plate girder and deck truss underpass, Montgomery and Philadelphia Counties, to Merritt Chapman & McLean Corp., Fidelity Bldg., Baltimore, Md., **$98,068*****reconstructing existing drainage structures, Warren Co., to G. S. Mellert Widener Co., Madena, **$8,493*****bituminous surfacing 0.6 mi. Wayne Co., to Sweeney Bros., 207 North Washington Ave., Scranton, **$14,304.** Grand total $576,927. Bids Apr. 3. Noted Apr. 8, C. D.—Apr. 16, E. N.-R.

**Pennsylvania** — Dpt. Hys., Harrisburg, bituminous surfacing, incl. six rein.-con. structures 6.39 mi. Susquehanna Co., to Hess Constr. Co., Drums, **$168,050.** Bids Mar. 6. Noted Mar 12, C. D.—Mar. 19, E. N.-R.

**Pennsylvania**—Dpt. Hys., Harrisburg, rein.-con. paving 0.37 mi. Philadelphia Co., to Union Paving Co., 1227 North Broad St., Phila., **$77,-289;** constructing two 10 ft. concrete outside lanes 5.08 mi. York Co., to J. Banks Constr. Co., 307 Meyer Bldg., Wilkes-Barre, **$314,230.** Bids Apr. 9. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

**Pennsylvania**—Dpt. Hys., Harrisburg, rein.-con. paving 1.51 mi. Cambria Co., to Central Pennsylvania Quarry Stripping Constr. Co., South Pine and Buttonwood Sts., Hazelton, **$104,339;** 420 ft. plain concrete guttering, Wyoming Co., to M. E. Wilt, Millersburg, **$1,-852.** Bids Mar. 27. Noted Apr. 2, C. D.—Apr. 9, E. N.-R.

**Pennsylvania** — Dpt. Hys., Harrisburg, bituminous surfacing 0.63 mi. Butler Co., to Newcastle Duntile Co., 1409 Moravia St., Newcastle, **$15,558*****plate girder, rein.-con. bridge 1.21 mi. Lackawanna Co., and bituminous surfacing 0.64 mi. Luzerne Co., to Tyler & Cole, Meshoppen, **$109,555** and **$12,049** respectively***grading, drainage 1.23 mi. and two rein.-con. structures, Indiana Co., to B. Gonzales Constr. Co., Inc., McKeesport, **$31,927.** Grand total $169,-089. Bids Mar. 20. Noted Apr. 2, C. D.

†*Federal Government*

**Tennessee**—State Hy. Dpt., Nashville, grading, drainage 3.229 mi. State Hy. 2, Coffee Co., to Hagen Constr. Co., Chattanooga, **$73,558***** 2.662 mi. State Hy. 1, Grainger Co., to Reynolds Constr. Co., White Pine, **$43,836*****grading, drainage, paving 2.354 mi. State Hy. 1, Cumberland Co., to Eller & Olsen, 32nd Ave. N., Nashville, **$89,702*****paving 5.121 mi. State Hy. 78, Lake Co., to Forcum-James Co., Dyersburg, **$98,498.** Grand total $305,594. Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, select material surface course with road oil surface treatment 4.308 mi. State Hy. "F," W. P. S. O. 865-A, Lamar Co., to H. L. Butler, 5219 Bradford Dr., Dallas, **$19,708.** Est. $50,000. New **P.W.A.** Bids Mar. 17. Noted Mar. 25, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, cut back asphalt on caliche and crusher run broken stone paving 3.863 mi. State Hy. 3, F. A. P. 219, reopened, Unit 2, Val Verde Co., to Lone Star Constr. Co., 423 Seguin Rd., San Antonio, **$129,795.** Est. $120,000. Bids Mar 17. Noted Mar. 25, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, selected material base, bituminous seal coat surfacing and planting 3.56 mi. State Hy. 85, Val Verde and Kinney Counties, to Brown & Root, Inc., 708 Colorado St., Austin, **$106,788.** Est. $110,000. New **P.W.A.** Bids Mar. 11. Noted Mar. 19, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, concrete paving 2.22 mi. State Hy. 72, De Witt and Lavaca Counties, to H. B. Zachry, Laredo, **$64,481** est. $70,000***grading, drainage structures, select material and bituminous seal coat surfacing 5.859 mi. State Hy. 30, Val Verde Co., to Cage Bros., Bishop, **$168,779** est. $170,000***grading, drainage structures 17.424 mi. State Hy. 22, Navarro Co., to Harrison Eng. & Constr. Co., 903 Fairfax Bldg., Kansas City, Mo., **$108,494** est. $110,000*** quadruple asphalt surface treating 13.012 mi. State Hy. 5, Donley Co., to Public Constr. Co., Denton, **$66,159** est. $70,000. Grand total $407,904. Bids Mar. 25. Noted Apr. 2, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, asphalt seal coat with prime coat surfacing 16.503 mi. State Hy. 5, Armstrong Co., to Cocke & Braden, Marshall, **$29,135** est. $30,-000. Bids Apr. 7. Noted Apr. 13, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading and drainage structures 5.151 mi. State Hy. "F," San Saba Co., to T. E. Sanderford, Belton, **$35,819** est. $40,000***9.246 mi. State Hy. "F," Clay Co., to C. H. McClellan & W. S. Crawford, Wichita Falls, **$39,585** est. $40,-000***3.66 mi. State Hy. 7, Coryell Co., to Word & Worrell, Itasca, **$100,067** est. $110,000 ***concrete paving 0.807 mi. State Hys. 2 and 44, McLennan Co., to R. W. Briggs & Co., Pharr, **$45,228** est. $50,000. Grand total $220,699. New **P.W.A.** Bids Apr. 7. Noted Apr. 13, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, roadside improvements 1.077 mi. State Hy. 35, Aransas Co., to Dodds & Wedegartner, San Benito, **$15,815** est. $15,000***grading, drainage structures, gravel and disintegrated limestone surfacing 6.083 mi. State Hy. "F," McLennan Co., to Cage Bros., Bishop, **$46,759** est. $50,000***grading, drainage structures 4.272 mi. State Hy. 36, Burleson Co., to Cage Bros. and J. C. Ruby Bishop, **$99,734** est. $100,000***grading, drainage structures 4.537 mi. State Hy. "F," Taylor Co., to E. T. Prater, Memphis, **$25,432** est. $25,000. Grand total $187,770. Bids Apr. 6. New **P.W.A.** Noted Apr. 14, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, asphalt seal coat with prime coat surfacing 10.956 mi. State Hy. 5, Donley Co., to Cocke & Braden, Marshall, **$18,833** est. $20,000*** grading, drainage structures, selected material and bituminous seal coat surfacing 4.778 mi. State Hy. 3, F.A.P. 274, Val Verde Co., to James Spencer & Son Constr. Co., Concan, and H. Page, Norwood Bldg., Austin, **$125,-110** est. $130,000***grading, drainage structures 10.185 mi. State Hy. 1, Hudspeth Co., to Crouch & Noland, Strawn, **$122,280** est. $120,-000. Grand total $266,223. Bids Apr. 8. Noted Apr. 14, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, concrete paving 12.04 mi. Hy. 5, Clay Co., to Standard Paving Co., Majestic Bldg., Fort Worth, **$255,730** est. $250,000***modified triple asphalt on caliche paving 19.041 mi. State Hy. 28, Floyd Co., to Morgan Constr. Co., Tower Petroleum Bldg., Dallas, **$162,927** est. $170,000***roadside improvements 5.8 mi. State Hys. 4 and 1, Taylor Co., to A. L. Cook, Ottawa, Kan., **$11,917** est. $10,000. Grand total $430,574. Bids Apr. 7. Noted Apr. 13, C. D.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures, metal surface (gravel), 3.861 mi. State Hy. "F," Denton Co., to J. P. Foty, 309 North Henderson St., Dallas, **$30,055** est. $35,000; grading, drainage structures, crusher run rock base surfacing 2.877 mi. State Hy. "F," W.P.S.O. 917-A, Rockwall Co., to Gifford-Hill & Co., 412 Mercantile Bldg., Dallas, **$52,768** est. $55,000. New **P.W.A.** Bids Mar. 17.

**Texas**—G. Gilchrist, state hy. engr., Austin, grading, drainage structures 4.074 mi. State Hy. 40, Angelina Co., to E. W. Hable, Corsicana, **$55,624** est. $60,000; quadruple asphalt surface treating 12.491 mi. State Hy. 5, Donley

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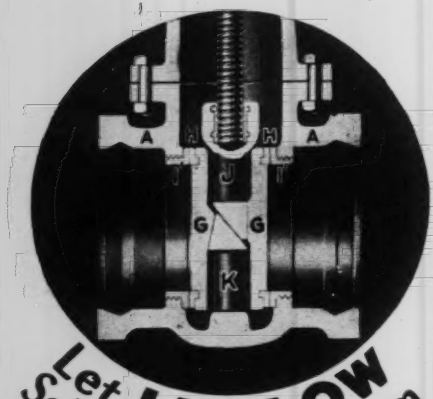


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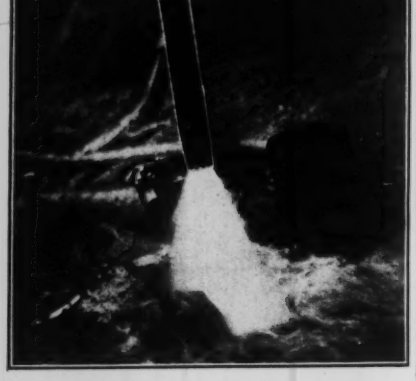

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Streets and Roads (Continued)

Co., to Public Constr. Co., Denton, **$60,023** est. $70,000. Bids Mar. 24. Noted Mar. 30, C. D.

**Utah**—State Road Comn., Salt Lake City, concrete surfacing 20,956 sq.yd. state highway extending from Beaver City S., Beaver Co., to W. W. Clyde & Co., Springville, **$76,701.** Est. $85,520. Noted Apr. 8, C. D.

**Vermont**—State Hy. Dpt., H. E. Sargent, ch. engr., Montpelier, cutback asphalt and refined tar on crushed stone mixed in place 0.9 mi. hy. Bennington and Shaftsbury, to E. H. Lewis, 354 North Main St., Andover, Mass., **$26,532;** graveling 9.4 mi. Route 111, Morgan Co., to Lockwood-Young Corp., 21 Union St., Concord, N. H., **$10,703.** Bids Apr. 3, awarded Apr. 10. Noted Apr. 9, C. D.

**Vt., Rutland**—City, E. L. Tracy, comr., Dpt. P. Wks., City Hall, constructing concrete sidewalks, day labor under **W.P.A.** $25,000.

★ **Wisconsin**—State Hy. Comn., Madison, to Kramp Constr. Co., 803 East Wisconsin Ave., Milwaukee, grading, draining, concrete surfacing 0.287 mi. South 84th St., South 84th St. Subway, **$59,028;** 1.634 mi. Milwaukee Racine Rd., **$226,892;** grading, draining, concrete base approaches 0.106 mi. Milwaukee Chicago Rd. **$47,527,** all foregoing Milwaukee Co. ***to W. A. Kutzke, Portage, grading, draining 1.202 mi. Marinette Co., **$14,857*****to C. & J. Theiler, Tomahawk, 5.267 mi. Walworth Co., **$52,867;** 1.484 mi. Oneida Co., **$23,273*****to Lampert & Lampert, 1055 Boven St., Oshkosh, grading, draining 1.97 mi. Junction City Dancy Rd., Contr. 1, **$33,857;** gravel surfacing 1.97 mi. Contr. 2, same road, **$11,446,** both Portage Co.***to Rein & Dahl, Stoughton, 3.292 mi. Green and Rock Counties, **$3,555*****to E. J. Murphy, R. 2, Kaukauna, 1.202 mi. Marinette Co., **$5,768*****to Genisot & Ferguson Constr. Co., Rhinelander, 1.484 mi. Oneida Co., **$7,265*****to W. Rees, Monroe, grading, gravel surfacing 11.637 mi. Green Co., **$13,954*****to F. Mashuda, Milwaukee, 1.369 mi. Waupaca Co., **$9,529*****to W. L. Kimmis, 1716 56th St., Superior, 0.37 mi. Contr. 2, Manitou Falls-Superior Rd., **$54,261;** 0.435 mi. Contr. 2, same road, **$51,911,** both Douglas Co.***to L. A. Bumgardner, 919 New York Bldg., St. Paul, Minn., 1.51 mi. Burnett Co., **$47,757;** grading, draining, rein.-con. culvert and timber, concrete I-beam structure 1.306 mi. Polk Co., **$51,392*****to Milwaukee Bridge Co., 3282 North 34th St., Milwaukee, constructing one overhead structure, rein.-con. culvert, Winnebago Co., **$47,562*****to Vierling Steel Wks., 313 West 23rd St., Chicago, Ill., one structure, six 25 ft. 2 in. yard two 24 ft. 7 in. spans, timber steel, rein.-con. deck, Oneida Co., **$16,617;** and one deck truss structure, four 75 ft. spans, Burnett Co., **$48,285.** Grand total $827,603. Bids Apr. 17. Rejected bids Apr. 17, grading, draining, gravel surfacing 0.615 mi. Winnebago Co.; grading, draining 1.031 mi. Grant Co. Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

**Wisconsin**—State Hy. Comn., Madison, grading, draining, concrete surfacing 0.764 mi. Dane Co., to P. T. Fess, Fess Hotel, Madison, **$39,852*****gravel surfacing 3.143 mi. Forest Co. to E. J. Murphy, Kaukauna, **$10,340*****top soil base course gravel surfacing 5.094 mi. Marquette Co., to Jaeger Bros., Inc., West Bend, **$27,053*****grading, draining, gravel surfacing 1.079 mi. Marathon Co., to P. Scherkenbach, R. 3, Station D, Box 215, Milwaukee, **$38,706*****1.169 mi. Dunn Co., to L. A. Bumgardner, 919 New York Bldg., St. Paul, Minn., **$24,079*****grading, draining 1.136 mi. Vernon Co., to J. Udelhofen, Potosi, **$117,344*****1.576 mi. Forest Co., to Ryan Bros., De Pere, **$25,870*****constructing one steel, concrete, timber structure, six 25 ft. spans, Marathon Co., to W. Blake & Son, 403 South River St., Appleton, **$14,517.** Grand total $297,761. Bids Mar. 27. Rejected bids Mar. 27, concrete surfacing 7.408 mi. Monroe Co.; 7.391 mi. Trempealeau Co.; constructing one 226 ft. high truss bridge in Dunn Co. Noted Apr. 2, C. D.—Apr. 9, E. N.-R.

†**Wyoming**—P. Roads, Denver, Colo., grading, draining, crusher run surfacing 11.414 mi. Grand Loop Hy., Yellowstone Natl. Park, to W. A. Norris, Cheyenne, **$140,356.** Bids Mar. 16. Noted Mar. 23, C. D.

**Man., Winnipeg**—Municipality, constructing concrete pavement 24 ft. wide from Kent St. to Birds Hill Rd. $23,256 voted; granolithic sidewalks, $1,922, day labor. Owner will purchase material.

## EARTHWORK, IRRIGATION, DRAINAGE AND WATERWAYS

### PROPOSED WORK

†**Ga., Savannah**—U. S. Eng., Savannah, cancelled bids to have been opened May 1, repairing and rebuilding 900 lin.ft. sheet piling training wall due to changed conditions caused by flood. Noted Apr. 7, C.D.—Apr. 9, E.N-R.

**Kan., Augusta**—City, W. W. Cron, clk., plans constructing 3½ mi. earthen levee and about 3,000 cu.yd. concrete and riprap. $101,000 plus. $70,000 bonds voted. P.W.A. project. L. Shook, Augusta, engr. Noted Apr. 23, C.D.

†**Louisiana** — U. S. Eng., P. O. Box 667, Vicksburg, Miss., indefinitely postponed bids to have been opened Apr. 30, repairing levees on left and right banks Ouachita River. Noted Apr. 7, C.D.—Apr. 9, E.N.-R.

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†**Louisiana**—U. S. Eng., Vicksburg, Miss., postponed indefinitely taking bids to have been opened Apr. 30, constructing 22,950 cu.yd. rubble work on east bank of Ouachita River. Noted Apr. 6, C.D.—Apr. 9, E.N.-R.

**Mass., Athol**—Athol Mfg. Co., 71 Church Hill Ave., plans replacing 75 lin.ft. concrete and earth dam washed out by flood, repairing remainder of dam damaged about 400 lin.ft. To exceed $23,000. Private plans.

**Mass., Manchester**—Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, engr., 100 Nashua St., Boston, plans dredging in Manchester Harbor. $40,000.

★ **New York**—Dpt. P. Wks., State Bldg., Albany, making plans deepening New York State Barge Canal between Syracuse and Three Rivers, to 14 ft. $1,000,000. T. F. Farrell, Albany, state engr.

**N. Y., Endicott**—Bd. Trustees Union Twp., plans repairing Choconut Creek Dike, reconstructing wooden pile wall with concrete and repairing automatic flood trap. O. K. Warwick, town supt. Owner will supervise and purchase materials, O. K. Warwick, in charge.

**Wis., Milwaukee**—A. Riemenschneider, city engr., Milwaukee, preparing plans 200 or 300 ft. gap in outer breakwater (Lake Muskegon) for City Park Bd. $91,000.

**B. C., Nelson**—P. C. Bruner preparing plans reclamation project involving 3,440 acres of flooded lands on west bank of Kootenay R.

**Sask., Estevan** — Saskatchewan Water Conservation Dpt., Regina, plans constructing dam and 2 reservoirs with total capacity of 2,500 acre ft. of water, the structures will be earth and riprapped and 3,500 acres will be irrigated. $50,000.

### BIDS ASKED

**Ill., Belleville**—See "Contracts Awarded."

**Minn., Austin**—See "Contracts Awarded."

**New Jersey**—May 5, by State Bd. Commerce & Navigation, Trenton, redredging channel in Manasquan River at mouth Bay Head Manasquan Canal, Point Pleasant, $3,000; and dredging section Inland Waterways Manasquan River, near New York and Long Branch R.R. in Brielle, Monmouth Co., $6,000. V. Gelineau, State House, Trenton, engr.

†**New Jersey**—May 18, by U. S. Eng., 2nd Dist., 30 Whitehall St., New York, dredging 981,000 cu.yd. from Passaic River and 112,000 cu.yd. from Shrewsbury River; adv. E. N.-R. Apr. 30.

**New Jersey** — May 11, by State Bd. Commerce & Navigation, Trenton, redredging channel in Inland Waterway, Great Bay, Galloway Twp., Atlantic Co. $21,000. V. Gelineau, State House, Trenton, engr.

**N. Y., New York**—May 6, by J. McKenzie, comr. Docks, Pier A, Battery Pl., dredging at southwesterly side of Ward's Island, Harlam River, Manhattan Boro, Contr. 2119.

†**Tex., Deepwater**—May 5, by U. S. Eng., Galveston, dredging and removing 65,000 yd. from Deepwater to Municipal Harbor.

**Tex., Port Lavaca**—May 11, by City, c/o F. M. Dudgeon, mayor, dredging harbor and turning basin and constructing wharf, protection works, etc. $22,000. P.W.A. project. Garrett Eng. Corp., 308 Hughes St., Houston, engrs. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

†**Virginia**—May 11, by U. S. Eng., Post Office Bldg., Baltimore, Md., dredging 292,700 cu.yd. material for channel 12 ft. deep, in Onancock River; adv. E. N.-R., Apr. 30.

**Canada**—May 12, by Secretary Dpt. P. Wks., Ottawa, Ont., constructing Portage Rd. and dock improvements at Great Bear River (St. Charles Rapids) North West Territories, involving 4,750 lin.ft. timber wharf, 4,000 lin.ft. ballast poles and deck, 450 cu.yd. rock ballast and fill, 2,000 lb. iron, clearing 2 acres, 5,000 cu.yd. excav., 200 lin.ft. culverts, 5,000 lin.ft. corduroy, 5,000 cu.yd. surface gravel, etc. $30,000. K. M. Cameron, Ottawa, Ont., engr.

### LOW BIDDERS

★ †**Mont., Fort Peck**—U. S. Eng., Postal Telegraph Bldg., Kansas City, Mo., Apr. 20, furnishing, placing steel inner-liner in Fort Peck Power Tunnel from Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $908,960. Est. $1,000,000. Noted Mar. 24, C.D.—Mar. 26, E.N.-R.

★ †**Texas**—Bureau Reclamation, Austin, Apr. 15, constructing Arnold Dam and power plant and processing of sand and crushed rock for Arnold and Hamilton Dams, Colorado River Project, Schedule 1, from Morris Knudsen Co., Boise, Idaho, $783,774; Schedule 8, from Case Constr. Co. and Bent Bros., Alhambra, Calif., $940,839. Noted Apr. 13, C. D.

### CONTRACTS AWARDED

**Ill., Belleville**—City straightening and deepening channel of Richland Creek between Illinois Ave. and 2nd St., a distance of about 5 blocks. W.P.A. labor. J. G. Cooney, 3303 Towland Ave., engr.

**Minn., Austin** — City, F. R. Smith, engr., moving 100,000 cu.yd. earth to create artificial Lake, relief labor. $37,000. W.P.A. project. P. R. Johnson, state procurement officer W.P.A. 1209 New York Bldg., St. Paul, will purchase materials.

†*Federal Government*

Earthwork, etc. (Continued)

**Tex., Pecos**—Red Bluff Water Power Control Dist., c/o J. H. Miller, secy., Pecos, machinery and equipment for Red Bluff Dam project, Schedule 1, turbines, penstock tubes, to S. Morgan Smith, York, Pa., $41,770***; Schedule 2, panel board, transformers and miscellaneous power house and substation control and protection equipment, to General Electric Co., 1 River Rd., Schenectady, N. Y., $54,495***; Schedule 3, crane, trolley and hoist, to Chisholm-Moore Hoist Corp., Tonawanda, N. Y., $1,158***; Schedule 4, machinery installation, etc., completing superstructure of power house building, to R. E. McKee, El Paso, $35,700. Grand total $136,423. Bids Apr. 2. Est. $150,000. P.W.A. Noted Apr. 16, C. D., under "Orla," —Mar. 12, E. N.-R., under "Pecos."

## UNCLASSIFIED

**PROPOSED WORK**

**Mont., Billings**—HANGAR, etc.—City plans constructing 100x128 ft. hangar and 30x128 ft. machine shop at municipal airport. $50,000 bonds voted. R. T. Hurdle, city engr. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**Nebraska** — RURAL ELECTRIFICATION — Southeastern Nebraska Public Power Dist., Beatrice, soon takes bids constructing 450 mi. lines in Gage Co. to serve over 1,100 farm families.

**Neb., Kramer** — TRANSMISSION LINES — Iowa-Nebraska Light & Power Co., Lincoln, authorized by Nebraska State Railway Comm., Lincoln, to construct 22 mi. transmission lines in Lancaster Co., near here. Est. about $35,000.

**Neb., Lincoln**—RURAL ELECTRIFICATION —Lancaster County Public Power Dist., Lincoln, plans rural electrification lines in Lancaster Co. $396,000. R.E.A. allotment approved.

**N. Y., Brooklyn**—PLAYGROUND, etc.—Dpt. Parks, Arsenal Bldg., New York, plans by A. Embury, 2nd, c/o owner, improving playground, incl. wading pool, Avenue W and West 10th St. $30,000.

**N. Y., Illion**—PARKS—Village, F. C. Whitney, mayor, City Hall, plans regrading land, leveling old creek bed, relocating monuments, fountains, etc., constructing sidewalks, planting, seeding land for new park. To exceed $23,000. E. Trimble, Village Hall, engr. I. Pugh, landscape archt.

**N. Y., New York**—BROADCASTING STATION—National Broadcasting System, 30 Rockefeller Plaza, plans constructing 500,000 watt broadcasting station, for Station WJZ, consisting of 640 ft. high tower and equipment. $300,000.

**N. Y., New York**—SUBWAY—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., postponed taking bids to have been opened Apr. 14, constructing 2nd Section, 6th Avenue Subway. No new date set. Noted Mar. 17, C.D. —Mar. 19, E.N.-R.

**N. Y., Valhalla** — AIRPORT — Bd. Supervs. Westchester Co., Court House, White Plains, plans constructing airport, here. W.P.A. project. Airport at Mount Pleasant abandoned.

**North Carolina**—INDUSTRIAL RAILROAD CROSSING—T. W. Sprull, Pungo, plans logging railroad in Beaufort Co., 4.9 mi. north of Pantego.

**N. C., Raleigh**—RURAL POWER LINES—Carolina Power & Light Co., L. V. Sutton, pres., will begin immediately to construct 49 mi. power lines in North Carolina, in rural sections, there will be 16 extensions, 5 of which are in Wake Co. $41,914.

**Oklahoma**—PIPE LINE—Sinclair-Prairie Co., Tulsa, making surveys constructing 9 mi. 8 in. oil pipe line from Moore to South Oklahoma City. $50,000. Private plans.

**Okla., Edmond** — TRANSMISSION LINE — Oklahoma Gas & Electric Co., 321 North Harvey St., Oklahoma City, made preliminary plans constructing 10 mi. 13,200 volt transmission line from Edmond to Arcadia. $30,000. Bylesby Eng. Co., 231 South LaSalle St., Chicago, Ill., engrs.

**Okla., Oklahoma City**—GAS PIPE LINE—Barnsdell Oil Co., 1st Natl. Bank Bldg., made preliminary plans constructing 6,000 ft. 24 in. wet gas line on Phillips St. $30,000. R. T. Looney, 1st Natl. Bank Bldg., engr.

**Okla., Oklahoma City**—GAS PIPE LINE—Phillips Petroleum Co., Bartlesville, made preliminary plans constructing 9,000 lin.ft. 24 in. wet gas line on Lottie St., $45,000; 10,600 lin.ft. 6 in. mud line on Everest St., $30,000. A. H. Riney, Bartlesville, engr.

**Tex., Kilgore**—SWIMMING POOL—City, 50x70 ft., rein.-con. swimming pool, 2 to 9 ft. deep, to O. L. Crigler, Kilgore, $25,970. In addition the city will furnish to contractor for his installation, mechanical equipment and underwater lights, to cost $6,000. Former contract rescinded. Noted Mar. 9, C.D. — Mar. 12, E. N.-R., under "Contracts Awarded."

**Tex., San Antonio**—CENOTAPH—City, State, Federal Government, c/o Federal Texas Centennial Comn., Wash., D. C., authorized by Fed. Texas Centennial Comn. to place cenotaph. $100,000.

**Alta., Athabasca Landing**—OIL DEVELOPMENT—Syndicate, c/o A. Hinds, Calgary, has been accorded permit by Provincial Government covering 20,000 acres and plans intensive oil development this summer, at least 6 wells will be drilled this year.

**Alta., Edmonton** — AIRPORT — City making plans improvements to city airport, and the use of McMurray tar sands for runways and an apron. $250,000. Contingent upon Dominion Govt. grant.

**N. B., Fredericton**—TRANSMISSION LINES —New Brunswick Power Com., Hon. H. D. Stewart, minister, plans extending power transmission lines from Fredericton to Maryland and from Bathurst West.

**N. S., Kentville** — RAILWAY REPLACEMENTS—Dominion Atlantic Railway, subsidiary of Canadian Pacific R.R., plans replacements $187,200, extensions $31,800, machinery $16,500.

**Que., Lachute**—DAM—Municipality plans by S. Ouimet, 706 St. Gabriel St., Montreal, constructing power dam and 3 mi. 12 in. water intake pipe.

**Que., Quebec City**—ELEVATOR—Municipality plans by H. P. Cimon, constructing elevator between St. Valier St. in St. Roch Ward and St. Real St. in St. Jean Baptiste Ward. $26,000.

**BIDS ASKED**

**Calif., Oakland**—LOADING PLATFORM—See "Contracts Awarded."

**Calif., San Francisco**—BATH HOUSE—See "Contracts Awarded."

**Ill., Chicago**—YARD IMPROVEMENTS—May 5, by Bd. Educ., 228 North LaSalle St., yard improvements, concrete walks, driveways and other improvements, in connection with 13 schools. J. C. Christensen, 228 North LaSalle St., Chicago, archt. P.W.A. project.

**Mass., Athol** — LANDSCAPING, etc. — See "Contracts Awarded."

**†Mass., Nantucket**—BOAT HOUSE, etc.—May 6, by Treas. Dpt., c/o Coast Guard Div., Custom House, Boston, constructing 1 story, 30x58 ft. frame boathouse, pile, and timber launchway, at Maddaket Coast Guard Station. Est. about $25,000.

**New Jersey**—HIGH SPEED LINE—May 8, at office J. K. Costello, secy. Delaware River Joint Comn., Administration Bldg., Bridge Plaza, Camden, repaving in Phila., Pa., and Camden, N. J., for high speed rail transit line across Delaware River Bridge from Eighth and Race Sts., Phila., Pa., to vicinity Haddon Ave. and Carman St., Camden, N. J., Contr. 16, P.W.A. project; adv. E. N.-R., Apr. 30.

**N. Y., Brooklyn**—WADING POOL—See "Contracts Awarded."

**N. Y., Brooklyn**—WADING POOL DRAINAGE SYSTEM—See "Contracts Awarded."

**N. Y., New York**—TRAFFIC LIGHTS, etc.—See "Contracts Awarded."

**N. Y., Rome**—PARKS, etc.—See "Contracts Awarded."

**N. C., Wilmington** — AIRPORT — See "Contracts Awarded."

**Oklahoma**—OIL DEVELOPMENT—See "Contracts Awarded."

**Okla., Oklahoma City** — GAS LINE — See "Contracts Awarded."

**†Wyo., Casper**—May 6, by Bureau Reclamation, Dever, Colo., furnishing, installing electric freight elevator, for Alcova Dam. R. F. Walter, ch. engr.

**†C. Z., Balboa**—WHARF, etc.—June 10 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing wharf and road. Spec. 7820. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

**CONTRACTS AWARDED**

**Calif., Oakland** — LOADING PLATFORM — Southern Pacific Co., 65 Market St., San Francisco, heavy timber and concrete loading platform, Kirkham and 5th Sts., day labor. Est. $25,000. Private plans.

**Calif., San Francisco**—BATH HOUSE—City and San Francisco Co., 4 story, rein.-con. bath house, Beach St. near Polk St. (Aquatic Park development), W.P.A. forces. Work is under jurisdiction of City Park Comn. Est. $450,000. J. M. Punnett, 58 Sutter St., engr.

**Fla., Jacksonville**—DUCT LINE, etc.—City Comn., constructing duct line connecting Laura St. substation and MacDuff Ave., substation, to Miller Electric Co., 610 Laura St., $68,527. The duct line is being constructed with City and Federal funds, city furnishing $94,000 and W.P.A. allowing grant of $76,909. City Comn., Apr. 8, furnishing cable for above duct line, from Miller Electric Co., 610 Laura St., $90,380. Noted Jan. 21, C. D.—Jan. 23, E. N.-R.

**Ill., Chicago**—RAILROAD—See "Materials and Equipment."

**Kan., Hays**—SWIMMING POOL, etc.—City constructing 75x100 ft., rein.-con., tile swimming pool and native stone bath house. W.P.A. labor, $25,000 bonds voted. E. T. Archer & Co., 609 New England Bldg., Kansas City, engrs. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

**Mass., Athol**—LANDSCAPING, etc.—Town, D. Higgins, W.P.A. local administrator, Athol,

†*Federal Government*

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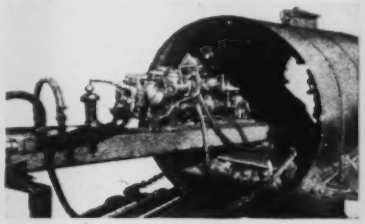
**BUILD SEWERS IN TUNNEL**



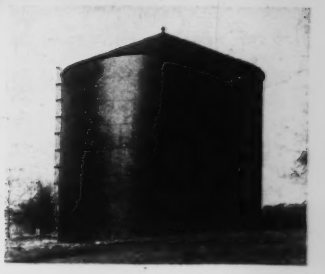
- Save paving replacement.
- Save traffic inconvenience.
- Save underground structure replacement.
- Build concrete lining blocks at home with local labor and local materials.
- Construct sewer in tunnel with local labor.

Skilled shield operator furnished by Link-Belt Company. As economical as open cut construction at depth of 12 ft Complete tunnel shield and block making equipment rented by Link-Belt Company at fixed price per foot of tunnel constructed. See descriptive article in Engineering News-Record, December 12, 1935, or write for reprint.

**LINK-BELT COMPANY**
2045 W. Hunting Park Avenue Philadelphia

**LINK-BELT T & M TUNNEL SHIELD** 5610

**STEEL STORAGE TANKS**



*for*

Water
Oil & Gasoline
Molasses
Acids
Alkalies

*or any other liquid.*

**Pittsburgh DES MOINES STEEL COMPANY**
3414 Neville Island, Pittsburgh
915 Tuttle St., Des Moines

Unclassified (Continued)

improvements to greens, landscaping, repairing and rebuilding driveways, at Ellinwood Golf Course, day labor under **W.P.A.** Est. $34,000. Owner purchases materials.

★ **New York** — VENTILATION BUILDING—Port of New York Authority, 111 8th Ave., New York, constructing New Jersey Ventilation Building for Midtown Hudson Tunnel, to G. Siegler, 26 Journal Sq., Jersey City, N. J., $520,516. **P.W.A.** Bids Mar. 31. Noted Apr. 1, C. D.—Mar. 12, E. N.-R.

**N. Y., Brooklyn**—WADING POOL DRAINAGE SYSTEM—Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing drainage system for swimming pool, Bay View and Neptune Aves., **W.P.A.** labor, $27,000. A. Embury, 2nd, c/o owner, archt. Owner is purchasing materials.

**N. Y., Brooklyn**—WADING POOL, etc.—Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing wading pool, drainage system and playground at Jamaica Ave. near Highland Blvd., day labor, $40,000. Owner purchasing materials. A. Embury, 2nd, c/o owner, archt.

**N. Y., New York**—ARENA—Madison Square Garden Corp., 825 8th Ave. and 307 West 49th St., air conditioning arena, to Airtemp, Inc., 405 Lexington Ave. Est. $50,000 or more.

**N. Y., New York**—TRAFFIC LIGHTS, etc.—Police Dpt., 240 Center St., constructing 250 lights, traffic lights and signal systems for Brooklyn, Queens, Bronx and Manhattan Boros, relief labor. Est. about $200,000. **W.P.A.** Owner will purchase materials.

†**N. Y., Northport**—Vet. Bu., Arlington Bldg., Wash., D. C., lawn sprinkler system, to I. L. Rathborne & Son, Rosslyn, Va., $20,748.

**N. Y., Rome**—PARKS, etc.—City, City Hall, constructing swimming pool $55,000, paving roads $86,000, wading pools $7,000, shelter houses $12,000, pavilion $3,000 grandstand $4,000, 10 drinking fountains $1,500, 8 fireplaces $400, toboggan run $2,000, water supply system $6,000, sanitary sewers $6,000, golf course $20,000, storm water drainage $7,000, landscaping $21,000, 16 tennis courts $8,000, soccer field $2,500, bleacher $6,000, running track $1,000, volley ball courts $2,400, 4 skating rinks $8,000, bridle paths $1,000, equipment $12,000, engineering work $10,000, soft ball diamond $5,000, storehouse for park and playground equipment $30,000, miscellaneous $3,000; own forces. Total $319,800. **W.P.A.** J. Gawkins, city engr.

**N. C., Davidson**—STADIUM—Davidson College, W. L. Langle, pres., 200 ft. athletic stadium, 60 ft. deep, to W. S. Lee Eng. Corp., 422 South Church St., Charlotte. Work to begin May 18.

**N. C., Wilmington**—AIRPORT—City, W. M. Hibbs, supervisor, constructing Bluethenthal Airport, areas of 3 runways will be increased, 42,000 cu.yd. excav., 1,500 ft. 30 in. concrete drainage pipe and several thousand ft. smaller pipe, lighting equipment to be installed, relief labor. Application approved by **W.P.A.** $53,-140.

†**O., Dover**—RELOCATION of TRACKS—U. S. Eng., 1st Natl. Bank Bldg., relocating tracks of Pennsylvania R.R., at Dover Reservoir, to H. T. Campbell Sons Co., Towson, Md., $115,488. Bids Apr. 4. Noted Apr. 20, C.D.—Mar. 19, E.N.-R.

**Okla., Oklahoma City**—GAS LINE—Brandall Oil Co., 1546 West Main St., Oklahoma City, constructing 12,000 lin.ft. 6 in. high pressure gas line on Laird Ave., own forces. $35,000. R. T. Looney, engr.

**Oklahoma**—OIL DEVELOPMENT, etc.—Asa Lee Mayes, 1st Natl. Bank Bldg., Oklahoma, City, oil and gas development, East Wewoka Fields, Seminole Co., day labor and separate contracts. Owners will purchase materials. $50,000 or more.

**R. I., Cranston**—STADIUM—Central Eng. & Constr. Co., general contractors, 210 Main St., Pawtucket, reinforcing steel for stadium at Athletic Field, for City, to G. Fred Swanson, Inc., 87 Weybosset St., Providence•••roofing, sheet metal, to Eagle Cornice Co., 314 Blackstone St., Providence•••electrical work, to Coken Co., 233 Richmond St., Providence•••painting, to Scully-McDonnell & Co., Inc., 71 Tyndall Ave., Providence•••millwork, to E. Brodeur & Son, Inc., 46 Gobeille Ave., Woonsocket••• structural steel, to James H. Tower Iron Wks., 50 Borden St., Providence•••plumbing, to T. R. Douglas, 8 Slocum St., Providence. Noted Feb. 21, C. D.—Feb. 27, E. N.-R., under "Contracts Awarded."

**Tex., Marfa**—NATURAL GAS SYSTEM—City, c/o H. A. Coffield, mayor, constructing gas system, Butane Air gas plant, steel pipe, distribution system, mixing plant, etc., to B. & M. Constr. Co., Petroleum Bldg., Oklahoma City, Okla., $63,887; equipment, to Zork Hardware Co., 309 North El Paso St., El Paso, $1,000. Est. $63,000. **P.W.A.** Bids Mar. 29. Noted Mar. 19, C. D.—Mar. 12, E. N.-R.

## MATERIALS AND EQUIPMENT

### PROPOSED WORK

RAIL—**Chicago, Ill.**—Chicago, Rock Island & Pacific R.R. Co., W. H. Petersen, ch. engr., LaSalle Street Sta., Chicago, Ill., plans purchasing 34,000 tons rails.

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SNOW PLOW—**North Adams, Mass.**—City, E. R. Doble, hy. comr., City Hall, plans purchasing one 5 ton tractor and snow plow during 1936.

MOTOR PATROL—**Brainard, Minn.**—**F. M.** Hageberg, aud., Crow Wing Co., takes bids early in May, 1 heavy duty motor patrol, $4,000 up.

SNOW REMOVAL EQUIPMENT — **Gaylord, Minn.**—Sibley Co., W. C. Oldenburg, aud., plans purchasing additional snow removal equipment, incl. one or two 5 or 6 ton trucks.

ROCK CRUSHER—**Winona, Minn.**—Winona Co., D. H. Fakler, aud., rejected bids Feb. 4, 1 rock crusher, roller bearing jaw, on steel skids, with loading hopper, heavy-duty screen, etc. Noted Jan. 29, C.D.

STEEL TANK—**St. Louis, Mo.**—Elizabeth Wiggenhauser, 509-11 South 2nd St., granted permit to install one 1,000 gal. underground steel tank for gasoline at 509-11 South 2nd St.

STEEL TANKS—**St. Louis, Mo.**—Firestone Tire & Rubber Co., 4232 Forest Park Blvd., applied for permit to install one 1,000 gal. underground steel tank for gasoline for private use, 4232 Forest Park Blvd.

TRUCK—**Flemington, N. J.**—Bd. Freeholders, Hunterdon Co., plans purchasing 5 ton 4 wheel drive truck, 110 hp. with dump body, for snow removal and road construction. $6,542.

STEEL STORAGE TANK—**Albany, N. Y.**—I. Padula, Stop 41, Schenectady Rd., plans purchasing 500 or 1,000 gal. steel gasoline storage tanks for gasoline storage station to be built at Stop 41 on Albany-Schenectady Hy. $1,000. P. J. Pagano, 61 Maiden Lane, engr.

STEEL GASOLINE STORAGE TANK—**Brewster, N. Y.**—Socony Vacuum Oil Co., 26 Bway., New York, plans purchasing steel gasoline storage tank for new gasoline service station, Main St. To exceed $1,000.

STORAGE TANK—**Clayton, N. Y.**—Standard Oil Co. of New York, Genesee Bldg., Buffalo, plans purchasing 1,000 gal. steel storage tank for service station, to be built at James and Jane Sts. To exceed $1,000. **Maturity at once.**

PIPE, etc.—**Lockport, N. Y.**—E. Noonan, Bailey Bldg., procurement officer W.P.A., soon purchases 10 in. c.i. pipe for water sewers to be layed in Washburn and Garden Sts., for City. To exceed $1,000.

STORAGE TANK—**Rochester, N. Y.**—Liberty Oil Co., 1441 North Clinton St., L. M. Weiss, pres., plans purchasing 500-1,000 gal. steel storage tank, for gasoline station to be built at 1441 North Clinton St. To exceed $1,000.

FIRE HOSE—**Watkins Glen, N. Y.**—Village Bd. takes bids early in May, 1,000 ft. fire hose, $1,150.

STEEL TANK—**Wellsville, N. Y.**—Sinclair Refining Co., Wellsville, plans purchasing steel gasoline storage tank for service station, on site of old Boyce Block and Lee Bldg., North Main St. To exceed $1,000.

FIRE TRUCK—**East Conemaugh, Pa.**—Conemaugh Volunteer Fire Dpt., plans purchasing new pumper truck. **Maturity soon.** To exceed $1,000.

STEEL TANKS, etc.—**Phila., Pa.**—Atlantic Refining Co., J. S. Parks, purch. agt., 260 South Broad St., plans installing 500 gal. steel tanks, electric pump and air compressor at gasoline service station to be built 55th and Walnut Sts. To exceed $1,000.

STEEL TANKS—**Phila., Pa.**—John Ashton & Son, 3701 North Broad St., plans installing 550 gal. steel tanks, electric pump, air compressor, etc., at service station to be built at Front and Dauphin Sts. To exceed $1,000.

TRUCKS—**York, Pa.**—Peoples Service Co., Inc., Frederick, Md., F. L. Stoner, secy., soon purchases 30 motor trucks, equipped with bodies suitable for ice delivery, to be delivered for use in York. To exceed $1,000.

FIRE FIGHTING EQUIPMENT—**Long Beach, Wash.**—Town Council, City Hall, plans purchasing fire fighting equipment, incl. 200 gal. pumper, $2,000.

CRUSHING EQUIPMENT — **Douglas Lake, Man.**—Flin Flon Gold Mining Syndicate plans installing this summer all necessary crushing and roasting equipment.

POWER GRADER—**Fullerton, Ont.**—Fullerton Twp., R. H. Pomeray, clk., plans purchasing new power grader. Est. about $3,500.

STONE QUARRY EQUIPMENT—**St. Bartelmie, Que.**—Carriere de St. Bartelmie, plans to operate as stone quarries and interested in equipment prices.

### BIDS ASKED

†AIR COMPRESSOR—**San Francisco, Calif.**—U. S. Penitentiary, J. A. Johnston, warden, 214 Post Office Bldg., taking bids 1 automatic duplex air compressor complete 26 cu.ft. per min. displacement f.o.b. Dock 1, Fort Mason. (Date not set.)

FIRE HYDRANTS, etc. — **San Francisco, Calif.**—T. A. Brooks, city purch. agt., taking bids 300 low pressure fire hydrants and parts.

CRANE—**Wash., D. C.**—May 7, by District Comrs., District Bldg., 1 crane, full revolving crawler, mounted, powered by gasoline engine.

MOUNTED CRANES—**Wash., D. C.**—May 7, by District Comrs., District Bldg., 2 [illegible] power crawler mounted cranes, one with [illegible] digging bucket, and other with ½ yd. [illegible] bucket, for D. C. Penal Institutions, [illegible] ton. Va.; adv. E. N.-R., Apr. 30.

TRACTOR TRAILERS—**Wash., D. C.**—May 14, by District Comrs., District Bldgs., 3 [illegible] trailers of semi-tractor type, heavy duty, [illegible] dump construction for use by D. C. Penal Institutions; adv. E. N.-R., Apr. 30.

TRUCK—**Greendale, Ind.**—May 12, by Town Bd., A. F. Eberhart, clk., 1½ ton truck [illegible] wheel base, regular utility type and [illegible] platform stake side body with 5,000 [illegible] 10,000 lb. winch, 30 ft. cable with or [illegible] pole derrick.

CRUSHED STONE, etc.—**Valparaiso, Ind.**—May 11, by Bd. P. Wks., E. J. Cotterman, clk., 5,000 tons crushed stone or gravel for road and street repairs; 20,000 gal. bituminous material.

CULVERT PIPE—**Allison, Ia.**—May 1, by Butler Co., G. W. Hesalroad, aud., 5,082 lin.ft. culvert pipe. O. W. Zack, co. engr.

†EXPLODERS—**Eastport, Me.**—May 4, by U. S. Eng., Eastport, 7,000 exploders, [illegible] No. 6, with copper wires, for Passamaquoddy Power Project, f.o.b. Eastport.

†AIR COMPRESSOR—**Boston, Mass.**—May 6, by Yards & Docks, Navy Dpt., Wash., [illegible] furnishing steam driven air compressor, [illegible] cu.ft. per min., Spec. 8012. Noted Apr. 16, C. D.—Apr. 23, E. N.-R.

CULVERTS—**Albert Lea, Minn.**—May 5, by A. C. Hertz, aud. Freeborn Co., 1,204 lin.ft. 15- to 48-in. sectional concrete pipe culverts, 2,780 ft. 12- to 72-in. copper iron corrugated metal pipe culverts, A. Pless, co. hy. engr.

MOULDBOARD—**Elk River, Minn.**—May 7, by E. M. Darrow, aud. Sherburne Co., 1 motor grader, 50 hp. 14 ft. mouldboard about 10,000 lb. weight. W. Brown, co. hy. engr.

†PIPE LINE DREDGE—**St. Paul, Minn.**—June 3 by U. S. Eng., 615 Commerce Bldg., constructing 1 self-propelled 20 in. pipe line dredges; adv. E. N.-R., Apr. 30.

PIPE, etc.—**Indianola, Miss.**—May 11, by Mayor and Bd. Aldermen, 100 ft. or more 4 in. galvanized water pipe, 1,000 ft. or more 3 in. galvanized water pipe with couplings, 500 ft. or more 2 in. galvanized water pipe with couplings. G. M. Keys, city clk.

†LUMBER—**Vicksburg, Miss.**—May 18, by U. S. Eng., 23,380 ft. B.M. dry rough cypress lumber, f.o.b. Vicksburg.

†TRACTOR—**Vicksburg, Miss.**—May 18, by U. S. Eng., Box 667, Vicksburg, crawler type tractor with bulldozer, f.o.b. Greenville.

†WIRE ROPE—**Vicksburg, Miss.**—May 19, by U. S. Eng., 4,000 lin. ft. wire rope, f.o.b., Monroe La.

ROAD OIL, etc.—**University City, Mo.**—May 6, by City, E. L. Bruns, clk., 3,000 gal. No. 2 road oil delivered and applied; 44,000 gal. No. 3 road oil delivered and applied; 3,000 gal. No. 4 road oil delivered and applied; 7,000 gal. Grade A asphaltic cement for surfacing delivered and applied; 7,000 gal. Grade B asphaltic cement for surfacing delivered and applied; 10,000 gal. grade C road oil for surfacing delivered and applied; 10,000 gal. cutback asphalt for cold patch delivered; and 3,000 tons limestone macadam delivered. W. Heimbuecher, city engr.

ASPHALTIC OIL—**Trenton, N. J.**—May 5, by Bd. Freeholders, Mercer Co., Court House, 8,600 gal. asphaltic oil, Grade MC-1; 6,200 gal. asphaltic oil, H.K.; 42,600 gal. Grade OA-4, to various W.P.A. projects, near here.

†CABLE—**Brooklyn, N. Y.**—May 25, by New York Signal Corps, Procurement Dist., Army Base, 58th St. and 1st Ave., 64,200 lin.ft. telephone cable.

†POWER UNIT—**Brooklyn, N. Y.**—May 8, by U. S. Eng., five power units, 5 kva., 110 volt, 60 cycle output.

CEMENT—**New York, N. Y.**—D. Mahoney, procurement officer W.P.A., Hotel St., Utica, taking bids 680 cu.yd. ready mixed concrete for paving Mohawk St. and other W.P.A. projects, for City, City Hall. To exceed $1,000.

STEEL OIL DERRICKS—**Oklahoma City, Okla.**—British-American Oil Co., 1st Natl. Bank in market for 2 steel oil derricks, 132 ft. high, $14,000. C. A. Sidwell, 1st Natl. Bank, engr.

DRILLING MACHINE — **Butler Pa.** — G. E. McKey, 1204 New Castle St., taking bids furnishing, drilling machine with tools and equipment. To exceed $1,000.

TRUCK—**Johnstown, Pa.**—May 4, by D. M. Baker, secy., Stonycreek Twp., R.D. 4, 1½ ton truck chassis with cab. To exceed $1,000.

STONE, etc.—**Wilkes-Barre, Pa.**—May 5, by W. W. Multer, controller Luzerne Co., Court House, furnished crushed stone, washed sand and gravel, rein.-con. pipe, vitr. clay pipe, c.i. pipe, cement, guard rail posts, bridge planking, bitumin road oils, bituminous cold patch, amiesite, ready mixed concrete and lubricants. To exceed $1,000.

ROLLER, etc.—**Wheatland, Pa.**—Borough, Borough Hall, F. L. Hutchison, secy., taking bids 5 to 10 ton gasoline operated combination roller, scraper and scarifier. To exceed $1,000.

†*Federal Government*

Materials, etc. (Continued)

†REINFORCING FABRIC—**Memphis, Tenn.**—May 7, by U. S. Eng., Memphis, non-corrosive reinforcing fabric.

†COOLING TOWER—**Quantico, Va.**—May 13, by Yards & Docks, Navy Dpt., Wash., D. C., cooling tower, motor driven circulating pump, etc., Spec. 8197.

ROAD OIL—**Menasha, Wis.**—May 5, by City, furnishing 50,000 gal. road oil.

FURIC CHLORIDE—**Milwaukee, Wis.**—May 7, by Sewerage Comn., 3,000 tons furic acid anhydrons basis, f.o.b. Milwaukee. J. L. Ferebee, ch. engr.

STEEL TANKS, etc.—**Winnipeg, Man.**—Service Motor Club, 170 Main St., in market for three 1,000 gal. tanks and pumps. $1,500.

POWER GRADER—**Fullerton, Ont.**—R. H. Pomeroy, twp. engr., in market for new power grader. $3,500 available.

MACHINERY—**Montreal, Que.**—Syndicate, c/o 1011 Y.M.C.A. Building, Drummond St., in market for mining mill and hoisting machinery, also complete diamond drill.

## CONTRACTS AWARDED

CENTRIFUGAL PUMPS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, furnishing 6 centrifugal pumps, each 500 100 ft. head, equipped with 440 V. 60 cycle motor. Spec. 1937, to Byron-Jackson Pump Co., East Slauson Ave., Huntington Park, $2,307. Bids Apr. 10, awarded Apr. 21.

†DRAGLINE CHAINS—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., Los Angeles, dragline chains, Proposal 573, to Harnischfeger Sales Co., 2029 Santa Fe Ave., $1,300. Bids Apr. 16, awarded Apr. 17.

EXPANDING ANCHORS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., expanding anchors as required during 6 month period, beginning from date of contract, incl. anchors with holding areas of 100, 200 and 300 sq.in., Spec. 1912, to Joslyn Co. of Calif., 5100 District Blvd., $2,594. Bids Apr. 6, awarded Apr. 14.

INSULATORS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Broadway, furnishing eight hundred four 66,000 volt pin type insulators, complete with 1/38 lead type pins, Spec. 1907, to Ohio Brass Co., 417 South Hill St., $5,331; and same amount to Westinghouse Electric & Mfg. Co., 420 South San Pedro St., $5,331. Noted Apr. 17, C. D.

†LUMBER—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., 413 M. ft. B.M. D.F. lumber, Proposal 556, to Morrill & Sturgeon, Yeon Bldg., Portland, Ore., $8,519. Bids Apr. 7, awarded Apr. 17.

MUCK SKIP CARS—**Los Angeles, Calif.**—S. A. Joseph, purch. agt. Metropolitan Water Dist., 306 West 3rd St., two 17 cu.yd. muck skip cars in accordance with Spec. E-244. Bid 57421, to Madsen Iron Wks., 5631 Bickett St., Huntington Park, $4,090. Bids Apr. 11.

OIL CIRCUIT BREAKERS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Broadway, furnishing two 34½ kv., 1,200 amp., 60 cycles, 3 pole single throw, truck mounted oil circuit breakers, Spec. 1893, to Kelman Electric & Mfg. Co., 1650 Naud St., $14,957. Bids Mar. 30, Noted Mar. 17, C. D.—Mar. 19, E. N.-R.

POSITIVE DISPLACEMENT TYPE WATER METERS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Wafer & Power, 207 South Bway., furnishing one thousand ⅝x1-in. one thousand five hundred ¾x1-in. and five hundred 1x1 in. positive displacement type water meters, to Pittsburgh Equitable Meter Co., 1918 East 7th St., $19,099. Bids Apr. 10, awarded Apr. 21.

PREMIX ASPHALTIC CONCRETE—**Los Angeles, Calif.**—H. E. Russell, purch. agt. Los Angeles Co., 524 North Spring St., 600 tons premix asphaltic concrete, f.o.b. Willowbrook, and 1,000 tons same, f.o.b. Inglewood Ave., Spec. 1164, to Vernon Paving Co., 3240 Bandini Blvd., $3,502. Bids Apr. 10, awarded Apr. 13.

†PUMPS—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., one 550 g.p.m. at 100 ft. head and one 700 g.p.m. 165 ft. head horizontal centrifugal pumps, f.o.b. Harrison, N. J., to Worthington Pump Co., 5075 Santa Fe Ave., $807. Est. exceeds $1,000. Bids Apr. 6. Noted Apr. 17, C. D.

ROAD OIL—**Los Angeles, Calif.**—H. E. Russell, purch. agt. Los Angeles Co., furnishing 1,585 tons 90% road oil, f.o.b. Compton, spur S. P. R.R., Spec. 163, to Western Emulsion Co., West 5th St., $16,405. Bids Apr. 10, awarded Apr. 13.

SUSPENSION INSULATORS—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 7,500 suspension insulators, Spec. 1901, to Ohio Brass Co., 417 South Hill St., $12,000. Bids Apr. 7, awarded Apr. 16. Noted Apr. 14, C. D.

TRUCK—**Oakland, Calif.**—W. W. Chappell, city clk., furnishing service fire truck, to American-La France & Foamite Corp., 1800 Park Blvd., $9,198. Bids Apr. 7, awarded Apr. 14. Noted Apr. 2, C. D.

GRADER—**Riverside, Calif.**—City Clerk, one leaning wheel grader, pneumatic tired wheels, to Brown Bevis Equipment Co., 4900 Santa Fe Ave., Vernon, $926. Bids Apr. 7, awarded Apr. 14. Noted Apr. 17, C. D.

ASPHALTIC CONCRETE—**Torrance, Calif.**—City Clerk, furnishing, spreading 975 tons asphaltic concrete on Cabrillo Ave., from Carson St. to Pacific Electric Depot, to Geo. R. Curtis Paving Co., 2440 East 26th St., Vernon, $3,023. Bids Apr. 7, awarded Apr. 17. Noted Apr. 16, C. D.—Mar. 26, E. N.-R.

CONCRETE—**New Haven, Conn.**—City, Bd. P. Wks., E. S. Nettleton, engr., Hall of Records Bldg., 500 cu.yd. 1-2-4 concrete, to C. W. Blakeslee & Son, 58 Waverly St., $3,800. Bids Apr. 6.

†CEMENT—**Ashton, Idaho**—Bureau Reclamation, Denver, Colo., 10,000 bbl. Portland cement for Island Park Dam, Upper Snake River Reclamation Project, to Idaho Portland Cement Co., Inkom, $25,000. Bids Apr. 2.

†CEMENT—**Boise, Idaho**—Bureau Reclamation, Denver, Colo., 31,300 bbl. Portland cement for Arrowrock Dam, to Oregon Portland Cement Co., 111 Southeast Madison St., Portland, Ore., $77,905. Bids Apr. 2.

STEEL RAIL—**Chicago, Ill.**—Chicago Rock Island & Pacific R.R. Co., W. H. Petersen, ch. engr., LaSalle Street Station, Chicago, Ill., 3,000 tons steel rail, to Carnegie Illinois Steel Co., Carnegie Bldg., Pittsburgh, Pa.; 3,000 tons, to Inland Steel Corp., 38 South Dearborn St. Will place by day labor.

CONCRETE PIPE, etc.—**Storm Lake, Ia.**—Buena Vista Co., W. H. Kaufman, aud., 7,000 lin.ft. 15 and 18 in. entrance concrete pipe; 288 lin.ft. 24- to 72-in. rein.-con. pipe, to Lake View Concrete Co., Lake View, $5,173. Bids Apr. 17.

DOUGLAS FIR LUMBER—**Waterloo, Ia.**—Black Hawk Co., B. Barnes, co. aud., 2 carloads Douglas fir lumber; 3 carloads Douglas fir lumber; 2 carloads Class A treated southern yellow pine or Douglas fir lumber; 2,850 lin.ft. creosoted piling, to Frudden Bridge Lumber & Supply Co., Greene Co., $9,162. Bids Apr. 20, awarded Apr. 20. Noted Apr. 14, C. D.

BITUMINOUS SURFACE BINDER—**Winthrop, Mass.**—Town, Bd. Selectmen, Town Hall, furnishing bituminous surface binder, to Bituminous Products Co., 1840 Parkway, Everett; furnishing crushed stone, to Concrete Materials Co., 509 Main St., Saugus. Bids Apr. 13. Noted Apr. 10, C. D.

PATROL GRADER, etc.—**Keewatin, Minn.**—Village, 1 motor patrol grader and snow plow, to Lange Tractor & Equipment Co., 304 Lake Ave. S., Duluth, $4,500. Bids Mar. 20.

ROAD ROLLER—**Minneapolis, Minn.**—City, F. S. Gram, city purch. agt., one 10 ton tandem road roller, power operated, to T. W. Rosholt Co., 3138 Snelling Ave., $4,540. Bids Apr. 2. Noted Mar. 26, C. D.

†INSULATED CABLE—**Boulder City, Nev.**—Bureau Reclamation, Denver, Colo., 6,850 lin. ft. 5,000 volt varnished cambric insulated cable, Schedule 1, to Levenson & Savasta, San Francisco, Calif., $7,845***for Boulder Dam Power House, 420,000 lin.ft. 5,000-1,000 and 600 volt rubber insulated cable, Schedule 2, and 14,000 lin.ft. rubber and asbestos insulated cable, Schedule 3, to Simplex Wire & Cable Co., 79 Sidney St., Boston, Mass., $11,209 and $4,214 respectively. Grand total $23,268. Bids Jan. 31.

ROAD OIL, etc.—**Oneonta, N. Y.**—City, City Hall, to L. P. Butts, Inc., Oneonta, road oil at 6.4c. per gal.; tar at 9.45c. per gal.***to J. M. Robertson Co., Oneonta, gravel at $1.10 per ton; cement at $237 per bbl., all above for highway maintenance.

GATE BOXES, etc.—**Syracuse, N. Y.**—A. Smingler, city purch. agt., gate boxes for Water Div., to Smith & Caffrey Co., Lodi St., $1,065 ***chlorine gas for Water Supply Div., to Solvay Sales Corp., Solvay, est. exceeds $1,000, for Bd. Contr. & Supply City Hall.

TRUCKS—**Syracuse, N. Y.**—A. Smingler, city purch. agt., 2½ ton stake truck, to Van Denbury Co., Inc., 741 West Genesee St., $1,153 ***1½ ton stake truck and 1½ ton supply truck, to White Co., 1220 West Genesee St., $1,035 and $1,236 respectively, for Bd. Contr. & Supply, City Hall. Grand total $3,424. Bids Mar. 2. Noted Feb. 27, C. D.

STEEL SHEETS, etc.—**Raleigh, N. C.**—Div. Purchase & Contr., A. S. Brower, dir., furnishing 250 tons steel sheets for automobile license tags, to Peden Steel Co., 512 West Hargett St., $17,000***15 crawler type tractors, 55 hp. and 18 crawler type tractors, 35 hp., to E. F. Craven, Greensboro, at $3,760 and $1,883 each respectively***2 graders, to T. L. Pitts & Son, Charlotte, at $685 each***16 eight ft. and ten 12 ft. leaning wheel graders, to North Carolina Equipment Co., 3116 Hillsboro St., at $750 and $1,295 each respectively***19,580 bd. ft. creosoted timber and 1,505 lin.ft. creosoted timber piles, to Gulf State Creosoting Co., Piedmont Bldg., Charlotte, $2,006***5,046 bd. ft. creosoted timber, also 12,050 bd. ft. creosoted timber and 1,050 lin.ft. creosoted piles, to Wood Preserving Corp., Up King St., Charleston, S. C., $387 and $1,333 respectively***4,780 pcs. mineral surface asphalt plank, to Dillon Supply Co., 216 South West St., $1,753. Bids Apr. 16. Rejected bids Apr. 16, 6,600,000 gal. bituminous materials, 42,000 lb. manganese crusher jaws. Noted Apr. 14, C. D.

GRADER—**Devils Lake, N. D.**—Ramsey Co., J. O. Peterson, aud., 1 heavy-duty motor grader, to Lewis Tractor & Mchy. Co., Fargo, $3,290. Bids Apr. 9. Noted Apr. 1, C. D.

TRACTOR—**Fargo, N. D.**—Cass Co., furnishing one Allis-Chalmers Diesel-motored crawler type tractor, to Lewis Tractor & Mchy. Co., 64 4th St., N., $6,170. (**Correction**—type of tractor.) Bids Mar. 6. Noted Apr. 13, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

CONCRETE MIXER—**Nanticoke, Pa.**—City, furnishing concrete mixer to Standard Equipment Co., Wilkes-Barre, $1,105; hydraulic pick-up sweeper, to Austin-Western Road Machine Co., Aurora, Ill., $6,790.

†TRANSMISSION LINES—**Knoxville, Tenn.**—Tennessee Valley Authority, constructing transmission towers to Blaw Knox Co., Blawnox Bldg., Pittsburgh, Pa. Bids Mar. 12. Noted Feb. 28, C. D.—Mar. 5, E. N.-R.

METERS—**Seattle, Wash.**—City Water Dpt., County-City Bldg., 100 meters, to Neptune Meter Co., 1519 Northwest Johnson St., Portland, Ore., $1,372. Awarded Apr. 2.

†PUMP, etc.—**Madison, Wis.**—Treas. Dpt. Procurement Div., pump, single vacuum return for Milwaukee County Institutions, to Skidmore Corp., 1433 North Dayton St., Chicago, Ill., $367***3,000 bd. ft. 2x8x12 and 32,000 bd. ft. 2x8x16 No. 2 yellow pine, North 44th and West Hope Sts., Milwaukee, to Paulsen Bros. Lumber Co., 2837 West Stark St., Milwaukee, $1,050***1 carload treated lumber, at Honey Creek Siding, West Allis, to S. J. Moss Tile Co., Granville, $448***350 cu.yd. crushed stone at 72nd and Chestnut Sts., Wauwatosa, to State Washed Sand & Gravel Co., 3238 North Bremen St., Milwaukee, $543. Grand total $2,408.

†PORTLAND CEMENT, etc.—**Milwaukee, Wis.**—National Park Service, Portland cement, to Horsfall Mill Co., Bridgeport, $936***concrete pipe, to Felker Bros., Marshfield, $198***concrete pipe, to Pipkorn Wallen Co., 7734 Harwood Ave., Wauwatosa, $325. Grand total $1,459. Bids Apr. 21.

ROAD OIL—**Neenah, Wis.**—City, 40,000 to 50,000 gal. asphalt road oil, to Camden Petrol. Co., 333 North Michigan Ave., Chicago, Ill., 5c. per gal. Bids Apr. 9. Noted Mar. 3, C. D.—Mar. 9, E. N.-R.

SWEEPER—**Racine, Wis.**—City, street sweeper, to Elgin Sweeper Co., Elgin, Ill., $6,690. Bids Mar. 17. Noted Mar. 13, C. D.

ROAD OIL—**Ripon, Wis.**—City, about 40,000 gal. road oil, to Iowa Rd. Building Co., 1495 Keo Way, Des Moines, Ia., 4.72c. per gal. Noted Apr. 3, C. D.

TRACTORS and TRAILERS—**Shorewood, Wis.**—Village, 2 tractors, to Milwaukee Power Equipment Co., 525 North 22nd St., Milwaukee, $1,618 each; trailers, to Highway Trailer Co., 1717 West Pierce St., Milwaukee, $1,275 each. Grand total $5,786. Noted Apr. 17, C. D.

ASPHALT—**St. John, N. B.**—Municipality, L. Wilson, comr. Wks., supplying 300 tons of asphalt, to Imperial Oil Co., $7,200. Noted Mar. 17, C. D.—Mar. 19, E. N.-R.

MOTOR GRADER—**Cornwall, Ont.**—J. G. Cameron, engr., County Chambers, supplying motor grader for Counties of Stormont, Dundas and Glengary, to Dominion Road Mchy. Co. Ltd., Goderich, $3,800. Noted Mar. 26, C. D.

PIPE, VALVES, etc.—**Ottawa, Ont.**—Secretary Bd. Control, furnishing c.i. pipe, to National Iron Corp. Ltd., Toronto***valves, to Builders Sales Ltd., Ottawa***fire hydrants, to Thos. Lawson & Son, Ottawa***lead pipe, to Crane Ltd., Ottawa, and Thos. Robertson (Canada) Ltd., Ottawa. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

## FOREIGN

**Argentina, Parana**—International Cement Corp., 342 Madison Ave., New York, plans portland cement plant, $2,500,000.

**Brazil, Rio de Janiero**—International Cement Co., 342 Madison Ave., New York, improving and equipping cement plant, separate contracts and day labor. Est. about $40,000.

**Cuba, Havana**—International Cement Co., 342 Madison Ave., New York, Portland cement plant improvements, day labor and separate contracts, $50,000 or more.

**Denmark and Sweden**—Parliaments of Denmark, Copenhagen, and Sweden, Stockholm, may take bids in summer for constructing 16 mi. bridge from Copenhagen, Denmark, to Malmoe, Sweden, $150,516,000. Construction materials, incl. steel and coal would be purchased abroad at approximate cost of $20,102,000, the rest supplied locally. The cost of the bridge across the Island of Zealand is estimated at $48,618,000; across Great Belt, $57,054,000; across Ore Sound, $33,744,000, jointly borne by both countries.

**England — Great Yarmouth** Municipality plans constructing 280 houses at North Denes, $530,000***Alfred Wood & Sons, Crown Engineering Wks., London Rd., **Lower Mitcham,** in market for one disc grinder 30 in. complete with press***Jones & Co., Ltd., Canal St., **Not-**

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†*Federal Government*

Foreign (Continued)

**tingham,** in market for 400 volt d/c TE ball bearing motors, two 7 hp., three 10 hp., and two 12 hp., 700/900 r.p.m.***J. Ball Wharles, **Kirkham,** in market for 6 and 8 ton road roller ***F. A. Watkins, **Coleford,** in market for 50-80 hp. crude oil engine, and 2 crude oil engines, 25-50 hp. cold starting type***F. Willis & Co., Hall St. Wks., **West Bromwich,** in market for black and galvanized steel sheets, also round flat and square bars, strip wire nails, etc.*** Batchelor & Co., Ltd., Johnstone Lane, **Sheffield,** plans by S. N. Cooke, Sun Bldg., Bennetts Hill, Birmingham, constructing canning factory, on 12 acre site, $500,000***Starch Products, Ltd., **Slough,** plans factory, $510,000***Bury** Municipality voted $500,000 for constructing new technical college***Sheffield,** Municipality, constructing 300 houses at Parson's Green, to M. J. Gleeson, Ltd., 8-22 Chesterfield Rd., Woodside, $574,610***J. Stevenson & Co., Ltd., Royal Pottery Wks., **Burslem,** plans plant at 13 acre site at Middlewich, $700,000***J. N. Fatkin, 17 Bigg Bldg., **Newcastle-on-Tyne,** plans preserve factory for L. Lourie, Ltd., $500,000*** H. S. Scott, 115 Colmore Row, **Birmingham,** plans factory at Aston, for Buttons, Ltd., $600,000***Bristol** Municipality votes $1,146,565 for new mental hospital***Adams, Holden & Pearson, 9 Knightsbridge Ave., **London,** plans remodeling mineral water hospital, $1,250,000*** F. Goodhew, **Worcester Park,** plans 346 houses and hotel, $1,100,000***E. A. Coleman, 39 Newhall St., **Birmingham,** plans by Skelcher, Machin & Watson, 156 Edmund St., constructing 2,000 houses $2,500,000***J. A. Teather, Mazda Bldg., Camps Lane, **Sheffield,** plans 550 houses for J. Laver & Co., Ltd., $925,000.

**England**—I. J. Johnston & Co. Ltd., 66 Victoria St., **London,** in market for 5 ton steam traveling crane, standard gage with long gio ***British Electric Co. Ltd., 8 Roseberry Ave., **London,** in market for one 4 position non-auto 400 line multiple magneto telephone exchange board***Randall Co. Ltd., 44 Arundel Terrace, **London,** in market for gas compressors, ¾ in. and 1 in. suction and delivery, steam oil eliminating hydro-extractor, 30 in. or large size of basket, Vindanda Hydras, 27 in., 30 in. and 36 in. and 7 small hand hydros***May 2, by Chairman Waterworks Committee, c/o F. Knowles, town clk., **Stockport,** constructing covered concrete reservoir, excavation forming embankment, concrete pile and rein.-con. iron work, etc.*** Cape Asbestos Co., Ltd., Harts Lane, **Barking,** in market for steam heated platen press with not less than 6 ft. x 3 ft. areas for low pressure work***Fletcher Estates, Leicester Ltd., **Worcester,** plans constructing 300 houses, $647,000*** **Leicester** Municipality voted $610,000 for constructing car park and $275,000 for bus terminal***Gasport** Municipality plans by A. Barlow, constructing 200 houses on Avery Lane, $475,000.

**Mexico, Morelos** — Secretariat of National Economy, Mexican Government, Mexico City, plans cane sugar refinery plant. To exceed $500,000 with equipment.

**South Africa, Johannesburg**—May 26, by T. H. Watermeyer, mgr., South African Railways & Harbors Administration, supplying 14 engine weigh scales of steel yard type, each capable of weighing 12 tons; May 5, by General Manager Rand Water Bd., supplying one 3,000 kw. steam turbine driven alternator, auxiliaries and switchgear.

**Wales**—J. H. Williams, Garth Wks., **Taffswell,** in market for best driven friction winch 10/15 cwt. gasoline driven crane, 6 small crane skips, 5/3½ concrete mixer, belt driven compressor, 80 cu.ft. 3,000 ft. jubilee rails, trams, oil tank, 300 gal. water cooling tanks and hydraulic concrete slab press***E. G. Reese, Great Western Dock, **Llanelly,** in market for Pulsometer pumps, Nos. 3 and 7 alw. wier service pump.

## PUBLIC BUILDINGS

### PROPOSED WORK

**Calif., Los Angeles**—Los Angeles Bd. Educ. approved appointment of W. T. Wright structural engr., 814 Architects Bldg., and H. Fisher, mechanical engr., 4283 South Lake St., to prepare structural and mechanical plans for new high school building and girls' physical education building, at John Adams Junior High School, 151 West 30th St. $175,000. Noted Mar. 12, C. D.—Mar. 19, E. N.-R.

†**Colo., Pueblo**—U. S. Forest Service, Federal Bldg., plans by W. E. Jackson, Federal Bldg., Denver, constructing rustic resort hotel, near San Isabel City, in San Isabel National Forest, 45 mi. southwest of here. $200,000.

†**Colo., Pueblo**—U. S. Resettlement Administration, Wash., D. C., constructing homes, barns, etc., for settling 195 families on 20,000 acres irrigated land, in Broadacres Section, southeast of here, and settling 52 farmers on 10,000 acres at Excelsior, 18 mi. east of here.

**Calif., Palo Alto** — Palo Alto School Dist. plans election May 14, for financing 2 story, rein.-con. Junior High School, to accommodate 1,000 students, administrative offices, 27 classrooms, boys' and girls' gymnasium, auditorium, 1,000 seating capacity, cafeteria for 600 and library. $360,000. Noted Aug. 20, C. D.—Aug. 22, E. N.-R.

**Conn., Hartford** — State, Governor W. N. Cross, State House, plans by Payne & Keefe, 231 State St., New London, 1 story, 110x165 ft., and four 50x50 ft. wings, rein.-con., steel air squadron hangar. Est. $230,000.

**Ind., Fort Wayne**—State School sketches by Pohlmeyer & Pohlmeyer, 260 Central Bldg., and takes bids about July 1, constructing 2 dormitories for asylum addition $150,000, and central power plant $100,000, on State Rd. 14, north of here.

**Ia., Atlantic**—City making plans constructing high school. $300,000. $130,000 allotted by P.W.A.

**Ia., Fairfield**—City Council will not construct municipal light and power plant and distribution system. Project abandoned. Noted Oct. 11, C. D.—Oct. 17, E. N.-R.

**Mich., Saginaw**—City plans being completed by C. E. Macomber, 2 story, basement, 92x104 ft., brick, steel, stone city hall, plain found. $253,000. P.W.A. project. Noted May 24, C. D.—June 6, E. N.-R.

**Miss., Tupelo**—Bd. Educ., plans by N. W. Overstreet & Town, Jackson, constructing negro school, two grammar schools, Junior and Senior High Schools, and restoring damaged schools. $300,000.

★**Mo., Jefferson City**—Missouri State Penitentiary and Bi-Partisan Advisory Bd., State Building Comn., E. M. Eagan, executive secy., Jefferson City, soon takes bids constructing 1 rein.-con., stone administration building, and 2 new cell blocks with connecting corridors, etc. $1,800,000. P.W.A. project. A. Gentry, Voskamp & Neville, 4 West 13th St., Kansas City, archts. Noted Jan. 3, C. D.—Jan. 9, E. N.-R.

**Mo., Marshall** — State School for Feeble Minded, Marshall, and Bi-Partisan Advisory Bd., State Building Comn., E. M. Eagan, executive secy., Jefferson City, bids in May. 2 rein.-con., brick custodian buildings. $206,000. P.W.A. project. Study & Farrar, 1303 Arcade Bldg., St. Louis, archts.

**Mo., Normandy** — Normandy Consolidated School Dist., A. G. Skelly, pres. Bd. Educ., F. B. Miller, supt. Schools, 6701 St. Charles Rock Rd., plans by W. B. Ittner, Inc., 408 Bd. Trade Bldg., 911 Locust St., St. Louis, brick, concrete Pasadena Hills grade School; Bel-Nor grade school addition; Washington School addition; Garfield School addition; Lincoln and Harrison Schools addition. $330,363. Voted $185,000 bonds for same. P.W.A. project.

**Mo., St. Louis**—City, cancelled bids to have been opened Apr. 17, furnishing, installing additional passenger elevator in City Hall, 12th Blvd. and Market St. $6,000-$7,500. Noted Apr. 13, C. D.

**Mo., St. Louis**—St. Louis Public Schools, c/o Bd. Educ., 911 Locust St., plans Garfield Grade School, 3 story, rein.-con., brick, stone, 2612 Wyoming St., $242,000; 3 story, brick, concrete, stone school for negroes, adjacent to Dexter St. and Compton Ave. P.W.A. project. G. W. Sanger, building comr., archt. and engr.

**Neb., Fremont**—Fremont Public School, A. H. Waterhouse, supt. Schools, indefinitely postponed construction of schools, $254,508. Failed to obtain P.W.A. funds. G. Grabe, 304 East 6th St., Fremont, archt.

**N. M., Las Cruces**—Dona Ana Co. sketches by Trost & Trost, El Paso Natl. Bank Bldg., El Paso, Tex., and soon takes bids court house. $180,000. P.W.A. loan and grant approved.

**N. Y., Akron**—Bd. Educ. Union Free School Dist. 3, Newstead, plans by E. B. Green, 1 Niagara Sq., Buffalo, high school addition, incl. gymnasium. To exceed $140,000.

**N. Y., Albany**—Bd. Educ., City Hall, plans constructing school, in Westland Hills Section. To exceed $140,000. Engineer and architect not appointed.

**N. Y., Albany** — Albany Regional Market Authority, Albany, will sell $500,000 city bonds to finance purchase of Munson Block and construct regional market. J. J. McMannus, city engr. Noted Feb. 27, C. D.—Mar. 5, E. N.-R.

**N. Y., Albany**—Broadway Arcade Building, Bway., plans installing elevator in building. Will soon house State Unemployment Insurance office.

★**N. Y., Binghamton**—Bd. Managers City Hospital, City Hall, plans constructing city hospital, Mitchell Ave. $500,000. **Maturity soon.** Will apply for P.W.A. funds. Noted Feb. 20, C. D.—Feb. 28, E. N.-R.

**N. Y., Clymer**—Bd. Educ. applied for $41,928 additional P.W.A. funds for constructing school. Bids overran appropriation and if funds granted will award contract. Noted Mar. 20, C. D.—Feb. 27, E. N.-R.

**N. Y., Copenhagen**—Bd. Educ., Copenhagen and Denmark, applied for $91,800 additional P.W.A. funds, to construct school. Bids overran estimate. Contract will be awarded if additional funds are granted. Noted Mar. 27, C. D.—Mar. 5, E. N.-R.

**N. Y., East Syracuse**—Bd. Educ. plans rebuilding East Heman Street Grade School. $150,000-$175,000. Architect and engineer not appointed.

★**N. Y., Lockport**—Bd. Educ., R. Kelley, supt. Schools, plans by Bley & Lyman, 505 Delaware Ave., Buffalo, brick, steel school, plain found. $800,000. **Maturity in 1936.** P.W.A. project.

**N. Y., Perry**—Village Bd. has been offered reduced power rates from New York Central Electric Corp. Owner will probably accept offer and abandon diesel power plant. L. C. Reynolds, Geneva, engr. Noted Mar. 30, C. D.—Apr. 2, E. N.-R.

**N. Y., Rensselaer**—Bd. Educ. will [illegible] struct school. $200,000. Project ab[illegible] May go ahead with smaller project. No[illegible] 2, C.D.—Dec. 5, E.N.-R.

**North Carolina** — State Hy. & P[illegible] Raleigh, rejected bids Apr. 15, for p[illegible] and electrical work at 2 prison camp[illegible] land and Pitt Counties. To exceed [illegible] Will readvertise. W. L. Craven, Raleigh[illegible] engr.

**North Carolina** — State Hy. and P[illegible] Comm., Raleigh, plans modern prison ca[illegible] divisional infirmary in Rowan Co., near [illegible] bury, $40,000; new camp near Wag[illegible] Scotland Co., $30,000; new barracks [illegible] County Camp, near Greenville, $20,000. [illegible] Craven, Raleigh, bridge engr.

†**N. C., Shelby**—Treas. Dpt. at offi[illegible] Archt., Wash., D. C., rejected bids M[illegible] constructing U. S. Post Office. Will [illegible] plans and readvertise. Noted Apr. 7, [illegible] Mar. 12, E. N.-R.

★**O., Cleveland**—Bd. Educ., election M[illegible] to vote bonds brick, steel, concrete [illegible] addition. $500,000. G. E. Burrows, [illegible] East 6th St., archt.

**Okla., Oklahoma City**—School Bd., 400 [illegible] Walnut St., plans by Layton & For[illegible] Braniff Bldg., constructing Northeast [illegible] School, 32nd St. $300,000. Funds [illegible] Noted Sept. 25, C. D.—Oct. 3, E. N.-R.

**Pa., Clarks Summit**—Scranton Poor Di[illegible] Connell Bldg., Scranton, plans power plan[illegible] Hillside Home and Mental Hospital. $300,000

★**Pa., Phila.**—Bd. Educ. plans by I. T. [illegible] erine, Administration Bldg., vocational [illegible] school, vicinity 40th and Market Sts., $1,[illegible] 000; and Senior High School, vicinity 24th [illegible] and the Parkway, $1,200,000. Application [illegible] be made to P.W.A. for grant.

**Tex., Fort Worth**—See "Contracts Awarded."

**Wash., Spokane**—Whitworth College, Country Homes Estate, plans school buildings, $150,000. Funds being raised. Architect not appointed.

**Ont., St. Catherines**—City sketches by R. I. Macbeth, 104 Queen St., and takes bids about May 15, 2 story, basement, 65x175 ft. city hall and police station. $150,000. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

**Que., Hull**—Provincial Govt., Quebec, bids early in June alterations and repairs to court house and jail, Main St. $150,000.

### BIDS ASKED

†**Calif., Los Angeles**—May 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., partial clearing of site for U. S. Post Office and Court House.

†**Colo., Florence**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $75,000.

†**Conn., Stamford**—May 26, by P. Wks. Administration, Div. Housing, Wash., D. C., constructing superstructure for Fairfield Court Housing Project H-9601. Noted Feb. 18, C. D. Feb. 20, E. N.-R., under "Contracts Awarded."

†**D. C., Wash.**—May 20, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing metal library bookstacks, electric book lifts, for Dpt. Interior.

†**Fla., Jacksonville**—May 27, by P. Wks. Administration, Div. Housing, Wash., D. C., constructing superstructures of Durkeeville Housing Project, Project H-4702. Noted Nov. 15, C. D.—Nov. 21, E. N.-R.

†**Fla., Pensacola**—May 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 4 electric elevators at Naval Air Station; adv. E. N.-R. Apr. 30. Noted Apr. 13, C. D.—Apr. 16, E. N.-R.

†**Ga., College Park**—May 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $60,000.

†**Idaho, Payette**—May 29, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $71,000.

**Ill., Chicago**—May 12, by Bd. Educ., 228 North LaSalle St., constructing May Elementary School addition, 521 South LaVergne Ave., and Ryerson Elementary School addition, 646 North Monticello Ave. P.W.A. project. J. C. Christensen, 228 North LaSalle St., archt.

†**Ill., Chicago**—May 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairing dome, U. S. Capitol Building.

†**Ill., Dwight**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E. N.-R., Apr. 30.

†**Ill., LaGrange**—May 28, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $75,000; adv. E. N.-R., Apr. 30.

†**Ill., Lemont**—May 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $71,000.

**Ind., Charlottsville** — May 15, by Jackson Twp., W. Oldham, trustee, Charlottsville, constructing 2 story, basement, brick, structural steel high and grade school, U. S. Rd. 40, $150,000. G. Schreiber, 2915 North Pennsylvania St., Indianapolis, archt. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

†**Ind., Tell City**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

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†*Federal Government*

Public Buildings (Continued)

†Ia., **Knoxville**—May 26, by Vet. Bu., Arlington Bldg., Wash., D. C., constructing C. T. Building 74, and dining hall building extension.

†Ia., **Missouri Valley**—May 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000; adv. E. N.-R., Apr. 30.

†Ia., **Muscatine**—May 14 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

†Kan., **Eureka**—May 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $68,000.

**Md., Glenn Dale**—May 12, by District Comrs., District Bldg., Wash., D. C., constructing electrical distribution and street lighting systems, Adult Unit at site of District of Columbia Tuberculosis Sanatoria, Prince George Co., near here. P.W.A. project; adv. E. N.-R., Apr. 30.

†**Mass., Walpole**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $69,000. Noted July 9, C. D.—July 11, E. N.-R.

†**Mich., Detroit**—May 15, by P. Wks. Administration, Div. Housing, Wash., D. C., constructing foundations of Brewster Housing Project H-1201. Noted Dec. 5, C. D.—Nov. 14, E. N.-R.

†**Mich., Detroit**—May 15, by P. Wks. Administration, Housing Div., Dpt. Interior, Wash., D. C., constructing foundations of Parkside Housing Project, Project H-1205. Noted Jan. 29, C. D.—Feb. 6, E. N.-R., under "Contracts Awarded."

†**Miss., Pascagoula**—May 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

**Mo., Farmington**—May 12, by State Hospital 4, Farmington, and Bi-Partisan Advisory Bd., State Building Comn., E. A. Eagan, executive secy., Jefferson City, constructing and erecting boilers, stokers, chimneys, engines and generators, for power plant building at State Hospital 4. P.W.A. project. J. A. Osborn & H. H. Morrison, Syndicate Trust Bldg., St. Louis, assoc. engrs.

**Mo., Fulton**—May 12, by State Hospital 1, and Bi-Partisan Advisory Bd., State Building Comn., E. A. Eagan, executive secy., Jefferson City, constructing engines and generators, constructing chimneys at power plant of State Hospital 1. P.W.A. project. R. Toenfeldt, Security Bldg., and Baumes McDevitt Co., Railway Exch. Bldg., St. Louis, assoc. engrs.

**Mo., Marshall**—May 12, by Missouri State School, Marshall and Bi-Partisan Advisory Bd., State Building Comn., E. M. Eagan, executive secy., Jefferson City, constructing and erecting engines and generators in power plant building at Missouri State School. P.W.A. project. J. H. Porter & Co. and G. E. Wells, Inc., Security Bldg., St. Louis, engrs. Noted Apr. 16, C. D. —Apr. 2, E. N.-R.

**Mo., Mount Vernon**—May 12, by State Sanitorium, Mount Vernon, and Bi-Partisan Advisory Bd., State Building Comn., E. M. Eagan, executive secy., Jefferson City, constructing and erecting boliers, stokers, engines, generators for power plant building at State Sanitorium. P.W.A. project. R. Toenfeldt, Security Bldg., and Baumes McDevitt Co., Railway Exch. Bldg., St. Louis, assoc. engrs.

**Mo., Thayer**—May 14, by City, C. A. Reef, mayor, remodeling building, concrete work, cooling tower and oil storage, Sect. 1: Diesel engine generator units with all auxiliaries, Sect. 2: electric distribution system and street lighting material, etc., Sect. 3, at municipal light and power plant, etc. $72,738. P.W.A. project. W. A. Fuller, 2916 Shenandoah Ave., St. Louis, engr. Noted Mar. 4, C. D.—Mar. 12, E. N.-R.

†**Neb., Valentine**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $71,000.

†**N. J., Ocean City**—May 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $120,000. Noted Feb. 19, C. D.—Feb. 27, E. N.-R.

**N. Y., Auburn**—May 14, by Dpt. Correction, State Office Bldg., Albany, electric elevator and electric refrigeration work at cold storage building, Auburn Prison.

**N. Y., Brooklyn**—May 4, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. Extension and Concord St., plumbing, drainage, heating, ventilating apparatus, electrical work and lighting for P. S. 234, East 17th St. and Avenue S, for Bd. Educ., 500 Park Ave., New York.

**N. Y., Brooklyn**—May 22, by Adjutant General, Div. Military & Naval Affairs, Capitol Bldg., Albany, heating work in 106th Infantry Armory.

**N. Y., Brooklyn**—May 20 (extended date), by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, heating, sanitary, electrical work, special electric fixtures, and electric elevator for additional accommodations for patients and employees, at Brooklyn State Hospital. $150,000.

†**N. Y., Buffalo**—May 29, by P. Wks. Administration, Housing Div., constructing superstructure for Kenfield Housing Project H-6703. Noted Dec. 13, C. D.—Dec. 19, E. N.-R.

**N. Y., Creedmoor**—May 27 (extended date) by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, heating, sanitary, electrical work, special electric fixtures, and electric elevator for additional accommodations for patients and employees at Creedmoor State Hospital. $200,000. Noted Mar. 23, C. D.

**N. Y., Dongan Hills**—May 8, by Dpt. Hospitals, 125 Worth St., New York, plumbing for altering and constructing additions to power house, Sea View Hospital.

†**N. Y., Hamilton**—May 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $68,000. Noted Apr. 28, C. D.—Sept. 5, E. N.-R.

**N. Y., Ithaca**—May 7, by Dpt. Health, State Office Bldg., Albany, refrigeration work and refrigerating unit and connections with Hermann M. Biggs Memorial Hospital.

**N. Y., Marlboro**—May 11, by Central School Dist. 1, general contract (except foundations) school, incl. heating, plumbing, electrical work, $37,441. W.P.A. project. G. W. Betz, 286 Wall St., Kingston, archt. W. E. Seelye & Co., 101 Park Ave., New York, engrs.; adv. E. N.-R., Apr. 30. Noted Mar. 19, C. D.—Mar. 26, E. N.-R.

**N. Y., Mount Morris**—May 14, by Dpt. Health, State Office Bldg., Albany, constructing work for miscellaneous additional work at Hospital for Treatment of Tuberculosis.

**N. Y., Newark**—May 27, (extended date), by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, sanitary, and electrical work for farm colony buildings, Newark State School.

**N. Y., New York**—May 15, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., New York, general contract and elevator work, heating, plumbing, electrical work for reconstructing and equipping Children's Pavilion, and installing elevator in City Hospital, Welfare Island, $107,205. P.W.A. project. M. Bernstein, 2 Columbus Circle, archt.

**N. Y., Orangeburg**—May 19 (extended date) by Dpt. Mental Hygiene, State Office Bldg., Albany, construction, heating, sanitary, electrical work, electric fixtures, elevators, dumb-waiters, for accommodations for patients and employees at Rockland State Hospital. $200,000. Noted Feb. 24, C. D.—Feb. 27, E. N.-R.

**N. Y., Pavilion**—May 7, by Bd. Educ. Central School Dist. 1, towns of Pavilion and Bethany, Genesee Co., Covington and Middlebury, Wyoming Co., and York, Livingston Co., general contract, plumbing, heating, ventilating, electrical work for school. $193,000. P.W.A. project. Bley & Lyman, 505 Delaware Ave., Buffalo, archts.; adv. E. N.-R., Apr. 30. Noted Mar. 23, C. D.—Mar. 26, E. N.-R.

**N. Y., Rochester**—See "Contracts Awarded."

**N. Y., Sonyea**—May 13, by Dpt. Mental Hygiene State Office Bldg., Albany, repairing power house stack, at Craig Colony.

**N. Y., Solvay**—May 7, by A. L. Brockway, archt., Clinton Sq. Bldg., Syracuse, constructing horticultural building for New York State Fair Industrial Exhibit Authority. A. B. Brewster, pres., c/o architect. $235,000. Noted Apr. 24, C. D., under "Syracuse."

**N. Y., Syracuse**—May 19, by Dpt. Agriculture & Markets, State Bldg., Albany, constructing women's building, near State Fair Grounds. To exceed $140,000. W. E. Haugaard, State Bldg., Albany, engr. Noted Apr. 2, C. D.—Apr. 9, E. N.-R.

**N. Y., Syracuse**—City, R. D. Marvin, mayor, City Hall, taking bids repairing and constructing county jail addition and equipment, incl. 36 new cells, Cedar St. Randall & Vedder, S. A. & K. Bldg., archts.

**N. Y., Syracuse**—May 5, by A. I. Brockway Estates, archt., Clinton Sq., brick, steel horticultural building, plain found., at State Fair Grounds, near here, for Industrial Exhibit Authority, 505 Clinton Sq. $238,000. Noted Mar. 23, C. D.—Mar. 26, E. N.-R., under "Solvay."

**N. Y., Warwick**—May 7, by Dpt. Social Welfare, State Office Bldg., Albany, miscellaneous construction work, at State Training School for Boys. Noted Feb. 21, C.D.—Feb. 27, E. N.-R.

**N. Y., Whitesboro**—Bd. Educ., Central School Dist., bids about June 1, constructing school. To exceed $140,000. A. F. Gilbert, 358 5th Ave., New York, archt. Noted Mar. 30, C. D.—Apr. 2, E. N.-R.

†**O., Cincinnati**—May 14, by P. Wks. Administration, Housing Div., 21st and C Sts. N. W., Wash., D. C., constructing foundations of Laurel Homes, Project H-1801. Noted Jan. 23, C. D.—Jan. 30, E. N.-R.

†**O., Dayton**—May 26, by Vet. Bu., Arlington Bldg., Wash., D. C., constructing administration building, etc.

†**O., Wadsworth**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $72,000.

†**Okla., Pawhusaka**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $86,000. Noted Nov. 18, C. D.—Nov. 21, E. N.-R.

†**Ore., Ontario**—May 27, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $76,000.

†**Pa., Farrell**—May 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $69,000; adv. E. N.-R., Apr. 30.

†**Pa., Phila.**—May 22, by P. Wks. Administration, Housing Div., 21st and C Sts., Wash., D. C., constructing superstructures Hill Creek Housing Project, Project H-3301-C. Noted Apr. 17, C. D.—Apr. 23, E. N.-R., under "Contracts Awarded."

†**Pa., Quakertown**—May 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $77,000.

†**S. C., Charleston**—May 25, by P. Wks. Administration, Housing Div., Wash., D. C., constructing superstructures of Meeting Street Manor and Cooper River Courts Housing Project, Project H-8901-B. Noted Dec. 23, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

†**Tenn., Dickson**—May 22, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $70,000.

†**Tenn., Dresden**—May 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $67,000.

†**Tenn., Sparta**—May 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $72,000.

†**Tex., Caldwell**—May 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

**Tex., Wichita Falls**—May 14, by State Bd. Control, C. Terr. chn. Austin, brick, stone ward building at Wichita Falls State Hospital. Est. $125,000. Voelcker & Dixon, Wichita Falls, archts. Noted Feb. 13, C. D.—Feb. 20, E. N.-R.

**Vt., Rutland**—May 4, by City, J. F. Cronan, pres. Longfellow School, Church St., furnishing, installing new furnaces and heating and ventilating systems in Kingsley School on Pine St.

†**Wash., Renton**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office; adv. E. N.-R., Apr. 30.

**Wis., Manitowoc**—May 13, by Bd. Educ., Katherine Trostek, secy., constructing 2 story, basement 65x430 ft. Southside Junior High School and boiler house, brick, steel, plain found. J. Chubb, 109 North Dearborn St., Chicago, Ill., archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**LOW BIDDERS**

★†**D. C., Wash.**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing additional buildings for U. S. Bureau of Engraving and Printing and new building for Bureau of Economics, Dpt. Agriculture, from Johns McShain, Inc., 1610 North St., Phila., Pa., $4,622,700•••elevator plant, from Otis Elevator Co., 810 18th St., $307,173. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

★**Pa., Phila.**—Bd. Educ., Apr. 22, superstructure vocational school building, 8th and Mifflin Sts., from McCloskey & Co., 1620 West Thompson St., $2,044,000•••electrical work from Mitchell & Co., 1337 McFerran St., $156,900•••elevators, from Atlantic Elevator Co., "D" St. and Erie Ave., $63,232•••hardware, from A. Soeffing Co., 833 Arch St., $41,750••• heating, from J. C. Kohler, 629 Crestview Ave., $372,000•••metal lockers, from Durabilt Steel Locker Co., 1708 North Edgewood St., $7,989 •••plumbing, from Wm. Walters & Sons, 1314 North Carlisle St., $120,784•••ventilating, from W. J. Donovan, 2239 North 27th St., $39,000. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

**CONTRACTS AWARDED**

†**Ala., Evergreen**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to E. M. Williams, Monroe, Ga., $41,975. Bids Apr. 16. Noted Mar. 19, C. D.—Oct. 24, E. N.-R.

†**Calif., Crescent City**—P. Wks. Officer, Mare Island, Navy Yard, miscellaneous repairs and alterations to dormitory and compass house, installing road culverts, at U. S. Naval Direction Finder Station, at St. George, Spec. 8148, to F. J. Maurer, Eureka, $1,495. Bids Apr. 8, awarded Apr. 15. Noted Apr. 14, C. D.—Mar. 26, E. N.-R.

**Calif., Los Angeles**—Bd. Educ., Chamber of Commerce Bldg., painting and miscellaneous work on Units 1 and 2 at Hammel St. School, 438 North Brannick St., and on administration and liberal arts building, science, arts, cafeteria and shop buildings at George Washington High School, 10,860 Denker Ave., to Patterson Bros., Builders Exchange, Oakland, $835 and $3,940 respectively, awarded Apr. 2 and 9, respectively•••on 1928 portion of main building at Riggin Ave. School, 5865 Riggan Ave., to Angelus Painting & Decorating Co., 2311 Riverdale Ave., $1,755•••on Shops 2 and 3 at Venice High School, Venice Blvd. and Walgrove Ave., Venice, to D. Zelinzky & Sons, 1438 East 18th St., $1,025•••on administration building (incl. academic unit and cafeteria) at Thomas Jefferson High School, 1319 East 38th St., to H. J. McKinley, 9305 Burton Way, Beverly Hills, $2,150. Grand total $9,705. Awarded Apr. 9.

†**Calif., Table Bluff**—P. Wks. Officer, Mare Island, constructing, repairing buildings and new water tank at U. S. Naval Radio Station, to O. Johnson, Loleta, $1,912. Bids Apr. 8, awarded Apr. 15. Noted Apr. 14, C. D.—Mar. 26, E. N.-R.

**Conn., East Haven** (br. New Haven)—Fusco-Amatruda Co., general contractors, 59 Amity Rd., New Haven, painting for 2 story, basement high school, Tyler and Taylor Sts., to S. Rus-

†*Federal Government*

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Public Buildings (Continued)

sota & Son, Inc., 599 Elm St., New Haven, for Town of East Haven, J. H. Corbett, chn. Building Comn.***cast stone, to Dextone Co., 166 Chapel St., New Haven***marble, to Earle B. Warner, Inc., 25 Garden St., New Haven. Noted Apr. 6, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

**Conn., Madison**—Smith Constr. Co., general contractors, 101 Water St., Derby, metal ceiling for school and gymnasium, to G. R. Cummings Co., 198 State St., Meriden, for Town, Bd. Selectmen***painting, to T. J. Volanth, Milford ***steel erection, to Leake & Nelson, Inc., 203 Ash St., Bridgeport. Noted Mar. 26, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

**Ill., East Moline** — City, general contract 3 story, brick, concrete school, to Stoehr & Palmgren, 2129 16th St., Moline, $132,038***plumbing, to G. J. Speck, 926 15th Ave., $12,084***heating, to J. L. Brady, 551 15th Ave., $21,726***electrical work, to Leithner & Weisher, 418 16th St., Moline, $5,559. Grand total $171,308. **P.W.A.** Bids Dec. 3. Noted Nov. 21, C. D.—Nov. 28, E. N.-R.

**Ind., Bloomington**—Bd. Trustees Indiana University, general contract 3 story, 57x196 ft. and 50x122 ft. medical unit, to L. Colvin, 803 Electric Bldg., Indianapolis, $267,225***heating, ventilating and plumbing, to Hayes Bros., 236 West Vermont St., Indianapolis, $78,199 ***wiring, to Sanborn Electric Co., 311 North Illinois St., Indianapolis, $24,885***elevator, to Otis Elevator Co., 1325 North Capitol Ave., Indianapolis, $5,340. Grand total $375,649. **P.W.A.** Bids Apr. 6. Noted Apr. 13, C. D.—Apr. 2, E. N.-R.

**Ia., Anamosa**—Bd. Supervs, Jones Co., general contract 3 story, basement, 88x121 ft., brick court house, to C. C. Larson Constr. Co., Council Bluffs, $139,973***plumbing and heating, to Carstens Bros., Ackley, $19,975***electrical work, to Metcalf Electric Co., Anamosa, $4,389. Grand total $164,337. Noted Apr. 1, C. D.

†**Mass., Boston**—P. Wks. Officer, Navy Dpt., Boston, improving elevators in Building 42, to Portland Elevator Co., 133 Oliver St., $8,639*** Building 149, to A. B. See, 164 Stuart St., Boston, Mass., $1,225***Building 149, to F. S. Payne Co., Cambridge, $3,403. Grand total $13,267. Bids Apr. 8. Noted Apr. 20, C. D.

**Mass., Greenfield**—Town, Supt. Schools, heating and plumbing system for Junior High School, to J. B. Kennedy, Newton Pl., low bid of $31,720 to be revised and reduced. Bids Feb. 17, awarded Apr. 15. Noted Feb. 24, C. D. —Jan. 30, E. N.-R.

**Mass., Holyoke**—City, Bd. P. Wks., City Hall, general contract 2 story, basement, 100x180 ft., brick, steel, stone memorial auditorium, Appleton and Maple Sts., to Daniel O'Connell's Sons, Inc., 480 Hampden St., $150,835***heating and ventilating, to Holyoke Supply Co., 210 Race St., $19,220***plumbing, to E. H. Fredrick Co., 73 Sargent St., $4,295***electrical work, to Brady Electric Co., 36 Bedford St., Fall River, $4,900. Grand total $179,250. Contracts pending P.W.A. approval. Bids Apr. 7. Awarded Apr. 16. Noted Apr. 20, C. D.—Mar. 26, E. N.-R.

†**Mass., Nantucket**—U. S. Coast Guard, Custom House, Boston, general contract boathouse, garage and workshop, Coskata Coast Guard Station, to Koslow & Ritchie, 7 Davis Square, Somerville, $17,799. Bids Apr. 13, awarded Apr. 17.

**Mass., Quincy**—M. Slotnick Co., general contractors, 333 Washington St., Boston, reinforcing steel for hospital administration building, to Morrison Skinner Co., Inc., New Salem St., Wakefield, for City, Comr. P. Wks., 13 Temple St.***reinforcing steel erection, to O. H. Horovitz, 31 Montrose St., Newton***granite, to Deacon Bros., Inc., 315 Centre St., Quincy*** structural steel, to West End Iron Wks., 263 Columbia St., Cambridge***structural steel erection, to A. Lavelli, 37 Spring St., Somerville ***miscellaneous iron, to Builders Ornamental Metal Wks., 163 Orleans St., East Boston*** roofing and sheet metal, to Eagle Cornice & Skylight Wks., 197 Sidney St., Cambridge*** painting, to Russell McCassey, 54 Playstead Rd., Newton***elevator, to Otis Elevator Co., 130 Clarendon St., Boston. Noted Mar. 31, C. D. —Feb. 13, E. N.-R., under "Contracts Awarded."

†**Mich., Detroit**—P. Wks. Administration, Div. Housing, Interior Bldg., Wash., D. C., demolishing buildings on site Brewster Housing Project. Project H-1201, to Detroit Building Material Co., 11070 Harper Ave., Detroit, $3,520. Noted Nov. 12, C. D.—Nov. 14, E. N.-R.

**Mo., Marshall** — Missouri State School, Marshall, and Bi-Partisan Bd. State Building Comn., E. M. Eagan, executive secy., Jefferson City, general contract altering brick, concrete boiler house at state school, to H. R. Willems & E. C. Childers, Marshall, $28,658. **P.W.A.** Bids Apr. 10. Noted Apr. 22, C. D.—Apr. 30, E. N.-R.

**Neb., O'Neill**—Holt Co., plumbing, heating and ventilating for court house, to L. Rodwell, 4230 Douglas St., Omaha, $9,974; wiring, to Sterling Electric Co., 2429 Farnam St., Omaha, $2,236. J. Latenser & Sons, Omaha, archts.

**N. Y., Avon**—Swarthout & Rowley, general contractors, Mount Hope Ave., Rochester, reinforcing steel and steel joists for Bd. Educ., Avon, to Concrete Steel Co., 207 James St., Syracuse, **P.W.A.** Noted Mar. 19, C. D.—Mar. 26, E. N.-R., under "Contracts Awarded."

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★†**N. Y., Canandaigua—Vet.** Bu., Arlington Bldg., Wash., D. C., constructing additional buildings, to Irwin & Leighton, 1505 Race St., Phila., Pa., $903,400***plumbing, heating and electrical work, to G. H. Drake, Inc., 218 Lexington Ave., Buffalo, $155,236***elevators, to Otis Elevator Co., 810 18th St., Wash., D. C., $12,381. Grand total $1,071,017. Bids Mar. 31. Noted Mar. 2, C. D.—Feb. 27, E. N.-R.

**N. Y., Dannemora** — Dpt. Correction, State Office Bldg., Albany, sanitary work for administration building and Cell Block E, Clinton Prison, to Barr & Creelman Engineers & Contractors Corp., 74 Exchange St., Rochester, $22,787. Bids Apr. 8. Noted Apr. 10, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

**N. Y., Dansville**—Bd. Educ. Central School Dist. 1, general contract brick, steel school (exclusive of foundations), School St., to A. Friederich & Sons, 710 Lake Ave., Rochester, **P.W.A.** Bids Apr. 19. Noted Apr. 15, C. D.—Apr. 2, E. N.-R.

**N. Y., East Rochester**—Stewart & Bennett, Inc., general contractors, 216 North Water St., Rochester, structural steel for school, East Ave., for Union Free School Dist. 13, to F. L. Heughes & Co., 1029 Lyell Ave., Rochester; roofing, to C. W. Flesch, Inc., 565 East Main St., Rochester. **P.W.A.** Noted Mar. 26, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

**N. Y., Eggertsville**—B. Rebescher & Sons, general contractors, 110 Timon St., Buffalo, steel joists for school, for Union Free School Dist. 13, to Ernst Iron Wks., 75 Lathrop St., Buffalo***roofing, to Umland Bros., 868 Jefferson Ave., Buffalo***marble and tile, to Italian Mosaic & Marshall Marble Co., 1085 East Delavan Ave., Buffalo. **P.W.A.** Noted Mar. 5, C. D.—Mar. 12, E. N.-R., under "Contracts Awarded."

**N. Y., Falconer**—Benz Eng. Corp., general contractors, 33 Main St., Salamanca, structural steel for school for Bd. Educ., School Dist. 6, to Erie Concrete & Steel Products Corp., 1301 Cranberry St., Erie, Pa.***reinforcing steel, to Bethlehem Steel Co., 1215 Hamburg Turnpike, Lackawanna***metal lathing and plastering, to Henderson Johnson Co., East Erie Blvd., Syracuse. **P.W.A.** Noted Feb. 7, C. D.—Feb. 13, E. N.-R., under "Contracts Awarded."

**N. Y., Greenwood**—Bd. Educ., School Dist. 1, general contract school, to F. J. Snyder, 245 Main St., Hornell***plumbing, to Van Patten Plumbing & Heating Co., Church St., Elmira ***heating, to E. J. Leary, 45 Stanley St., Buffalo***electrical work, to Booth Electric Co., Bradford, Pa. Est. $75,000. Subject to **P.W.A.** approval. Noted Dec. 10, C. D. Dec. 12, E. N.-R., under "Contracts Awarded."

**N. Y., Hartford**—M. E. Ryan, general contractor, 1545 Union St., Schenectady, structural steel for school, for Central School Dist. 1, to Franklin Fordyce Co., Inc., 732 Bway., Schenectady***cast stone, to Onondaga Litholite Co., 102 North Beech St., Syracuse*** roofing, to Hudson Falls Hardware Co., 186 Main St., Hudson Falls. **P.W.A.** Noted Mar. 30, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

**N. Y., Lima**—Ifland & Rogers, general contractors, 30 Alexander St., Rochester, heating for school, Rochester St., for Union Free School Dist. 9, to W. C. Barber, 1736 Portland Ave., Rochester***plumbing, to E. G. Snyder, 86 Scio St., Rochester***electrical work, to Horacek & Hayden, 5 Norman Rd., Rochester. **P.W.A.** Bids Mar. 20. Noted Apr. 7, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

**N. Y., Marcellus**—Bedford Constr. Co., general contractors, 1300 Broad St., Utica, plumbing, for school, to C. W. Rishell, 109 Washington Ave., Endicott, for Central School Dist. 1***heating, to F. Brandt Co., 515 Oakwood Ave., Syracuse***electrical work, to Doster & Egan, 240 East Erie Blvd., Syracuse. **P.W.A.** Bids Mar. 27. Noted Mar. 7, C. D.—Mar. 9, E. N.-R., under "Contracts Awarded."

**N. Y., Newburgh**—Lower Hudson Regional Market Authority, c/o D. A. Davies, Congers, general contract regional market, to L. H. Swenson, Inc., 2 Cannon St., Poughkeepsie, $99,250. Subject to **P.W.A.** approval. Bids Apr. 10. Owner soon takes new bids on plumbing, heating and electrical work. Noted Mar. 25, C. D.—Mar. 26, E. N.-R.

**N. Y., New York**—Comstock Constr. Co., general contractors, 521 5th Ave., New York, 1,350 tons structural steel for Bronx Industrial High School, for Bd. Educ., 500 Park Ave., to Harris Structural Steel Co., 419 4th Ave. Noted Apr. 8, C. D.—Apr. 16, E. N.-R.

**N. Y., New York**—National Excavation Corp., general contractors, 295 Madison Ave., structural steel for P. S. 113, for Bd. Educ., 500 Park Ave., to Bethlehem Steel Co., Bethlehem, Pa. Noted Feb. 27, C. D.—Mar. 5, E. N.-R., under "Contracts Awarded."

**N. Y., Rochester**—City, City Hall, renovating, incl. new floors, doors, roof, painting, etc., for city hall, relief labor. $110,000-$150,000. **W.P.A.** A. Hackett, 1460 South St., procurement officer W.P.A., will purchase materials.

**N. Y., Rome**—Bevan Constr. Co., general contractors, 3566 East Genesee St., Syracuse, structural steel for hospital, Floyd Ave., for Bd. Managers Oneida Co. Hospital, to Utica Steam Engine & Boiler Wks., 800 Whitesboro St., Utica***roofing, to Central City Roofing Co., East Erie Blvd., Syracuse***metal lathing and plastering, to Henderson-Johnson Co., Inc., 1407 East Erie Blvd., Syracuse. **P.W.A.** Noted Apr. 2, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

†**N. Y., Schenectady**—P. Wks. Admin. Div. Housing, Wash., D. C., demolishing buildings on site of Schonowee Village Project, Project H-5801, to Cuyahoga W. Co., 6311 Kinsman Rd., Cleveland, O., Bids Apr. 7. Noted Apr. 14, C. D.—A. E. N.-R.

**N. Y., Schenectady**—Dpt. Military & Affairs, Capitol Bldg., Albany, electric at State Armory, to J. M. Stanley, 65 line Ave., Albany, $13,169. Bids M. Noted Mar. 3, C. D.—Mar. 5, E. N.-R.

**Pa., Roaring Springs**—C. E. Stephen School Dist., general contract high sch A. E. Martz, Martinsburg***heating a tilating, to Mulch Bros., Hollidaysburg trical work, to Chathams Electric, I toona. Est. $157,000. Bids Dec. 13. Dec. 9, C. D.

**Pa., Wilmerding**—Bd. Educ., M. D. secy., constructing 3 story, part basement, stone, steel high school and athleti Marguerite and Herman Sts., to W. S. Co., 2565 5th Ave., Pittsburgh, $3 **P.W.A.** Hunter & Caldwell, 5th and Sts., Altoona, archts. Noted Mar. 20, Mar. 26, E. N.-R.

**R. I., Burrillville—Town**, Bd. Selectm C. Sweeney, supt. Schools, 2 story, bas 46x130 ft., 50x56 ft., brick, steel, ston school, concrete found., to A. F. Smiley Co., 202 Oak Hall Bldg. Est. exceeds $ 000. Noted Mar. 26, C. D.—Apr. 2, E. N.

**R. I., Cranston**—E. Turgeon, general contractor, 36 Exchange Pl., Providence, pa for city hall, to Scully McDonnell & Co. 71 Tyndall Ave., Providence, for City, H. Schofield, purch. agt.***terra cotta, to A Terra Cotta Co., 25 West 44th St., New ***fireproofing and roof tile, to Morton proof Co., Buffalo, N. Y.***structural steel iron, to Providence Steel & Iron Co., 27 Ave., Providence***roofing, to Eagle Co., 314 Blackstone St., Providence. Apr. 13, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

**R. I., Howard** (Cranston)—Rowley Co., general contractors, 260 Central Pawtucket, excavation for employees' dormi at Mental Hospital, for State Emergency Wks. Comn., State House, Providence, to & Ricci Excav. Co., Pheenix Ave., Cranston R. I., and Crane Service Co., 330 Glenwood Ave., Pawtucket***plastering, to Oscar Trottier, Inc., 10 Whittaker St., Providence building finish, to Hyde Murphy Co., 80 Boylston St., Boston, Mass.***reinforcing steel, to Truscon Steel Co., 87 Weybosset St., Providence ***structural steel, to Bethlehem Fabricators Co., Bethlehem***granite, to John Capaldi Ledge St., Providence***limestone, to Indiana Stone Co., Bedford, Ind.***roofing, to Eagle Cornice Co., 314 Blackstone St., Providence*** painting, to E. F. O'Donnell, 18 Stokes St., Providence.

**R. I., Howard** (Cranston)—O. D. Purington Co., Inc., general contractors, 49 Westminster St., Providence, cement for school and administration building at Sockanosset School, for State, Emergency P. Wks. Comn., Providence, to H. R. Horton Co., 459 Co. So. Water St., Providence***reinforcing steel, to Concrete Steel Co., 294 Washington St., Providence***structural steel, to Jas. H. Tower Iron Wks., 50 Borden St., Providence***granite, to Frank Castellucci, 184 Cumberland St., Providence*** roofing, to C. G. Brunnekow Co., 227 Globe St., Providence***painting, to E. F. O'Connell, 18 Stokes St., Providence***limestone, to Helton ville Limestone Co., Bedford, Ind. Noted Jan. 20, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

★**Tex., Fort Worth**—City, c/o G. D. Fairtrace, mgr., to R. F. Ball Constr. Co., 300 South Main St., superstructure memorial tower, $99,175; superstructure auditorium, $322,360 ***to Butcher & Sweeney, 8064 Taylor St., foundation for memorial tower, $6,400; foundation for auditorium, $8,500; foundation for coliseum, $14,700***to Cain & Cain, Majestic Bldg., livestock unloading pens, $1,772***to Thos. S. Byrne, Inc., Fort Worth National Bldg., cattle exhibit building, $169,250***to Jas. T. Taylor, 1st Natl. Bldg., horse show horses building, $95,223; superstructure coliseum, $459,089. Grand total $1,176,412. Bids Feb. 7. Rejected bids Apr. 7, for entrance gate, merchants' exhibit building, will readvertise. Noted Feb. 21, C. D.

**Wis., Marshfield**—City, E. E. Forseth, clk., improvements at municipal power plant, incl. turbine room changes, piping, miscellaneous equipment, to Power Service Corp., 711 Wesley Temple Bldg., about $48,000. Noted Nov. 13, C. D.—Nov. 21, E. N.-R.

†**Wyo., Yellowstone Park**—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Siegfus Bros., 1335 Westminister Ave., Salt Lake City, Utah, $87,466. Bids Feb. 5. Noted Feb. 7, C. D.—Jan. 16, E. N.-R.

†**T. H., Pearl Harbor**—Yards & Docks, Navy Dpt., Wash., D. C., improving elevators at Naval Fleet Air Base, Spec. 8110, to Von Hamm Young Co., King and Bishops St., Honolulu, $4,979.

## COMMERCIAL BUILDINGS

### PROPOSED WORK

**Calif., Oakland** — Merritt Hospital, Webster and Hawthorne Sts., plans by Masten & Hurd.

†*Federal Government*

Commercial Buildings (Continued)

233 Post St., San Francisco, rein.-con. hospital addition. $150,000.

**Calif., San Francisco**—St. Ignatius High School, Fulton St. above Baker St., plans rein.-conc. steel gymnasium, Turk and Stanyan Sts. $150,000 or more.

**Conn., Hartford** — St. Anthony's Parish, Judge Francis A. Pallotti, chn. Church Comm., plans by D. A. Guerriero, 1029 Main St., 1 story, basement, yellow brick, stone church, Market St. $140,000.

**Conn., Newington** — A. J. Apter, Hartford Ave., purchased 110 acres and plans development same for residential purposes. $140,000. Architect not appointed.

**Ind., Indianapolis**—Rubush & Hunter, archts., 1000 Architects & Builders Bldg., Indianapolis, soon takes bids constructing 8 story, 40x180 ft. steel department store, Meridan and Washington Sts., for H. P. Wasson & Co., 16 West Washington St. $250,000.

★ **Mo., Clayton** (St. Louis P. O.)—Syndicate, c/o J. H. Preiss of J. Preiss & Co., Security Bldg., St. Louis, sketches 16 story, basement, brick, stone, concrete apartment, Hanley Rd. between Clayton Rd. and Wydown Blvd. Est. about $1,000,000.

**Mo., St. Louis**—Leko Realty Co., 417 Pierce Bldg., 4th and Pine Sts., soon lets general contract 1 and 2 story, basement, 97x205 ft. theatre and store building, Grand Blvd. and Natural Bridge Ave., $175,000 incl. site. R. Boler, 7332 Brooklyn Ave., Kansas City, archt. Noted Apr. 13, C. D.—Apr. 16, E. N.-R.

**Mo., St. Louis**—Sisters of Mercy c/o Mother Ignatius, superior, Laclede Station Rd. and South Spring Ave., soon lets contract 4 story, basement, and 6 story, tower, 398x446 ft. home for business women, Maryland and Newstead Aves. Est. about $235,000. H. P. Hess, Ambassador Theatre Bldg., archt. Noted Apr. 1, C. D.—Apr. 4, E. N.-R.

**N. J., Netcong**—Country Club Estates, Budd Lake, Morris Co., P. O. Netcong, plans group 300 summer cabins, Budd Lake, separate contracts awarded."

**N. J., Union City**—Corporation, c/o P. E. Musto, 214 Palisade Ave., plans 8 story apartment, 214 Palisade Ave. $400,000.

**N. Y., Amagansett**—R. B. Allen Corp., 500 5th Ave., New York, plans constructing tract development, incl. paving, grading, landscaping and group dwellings on 235 acre tract. To exceed $150,000.

**N. Y., Bayside**—N. Brait, 215 Montague St., Brooklyn, plans by D. J. Levinson, 161-02 84th Dr., Jamaica, constructing 1 story, frame dwellings, 33rd Rd. and 210th St. $140,000.

**N. Y., Bayside**—Thebes Realty Corp., 38-17 Bell Ave., plans by J. Unger, 39-01 Main St., Flushing, group frame dwellings, 204th St. and Crocheron Ave. $140,000.

**N. Y., Brooklyn**—Hampton Realty Corp., 313 4th Ave., plans by E. O. Holmgren, 373 Fulton St., constructing group 2 story, brick dwellings, Remsen Ave. near Lenox Rd. $140,000.

**N. Y., Brooklyn**—Corporation, c/o H. Hession, 719 Linden Blvd., plans constructing group 60 brick, frame dwellings, Linden Blvd. and Schenectady Ave. To exceed $250,000.

**N. Y., Brooklyn**—Org Realty Corp., c/o B. J. Govern, 1016 Ocean Ave., plans 6 story, 85x120 ft. apartment, Prospect Park South and 11th St. $150,000.

**N. Y., Brooklyn**—Parksite Holding Corp., c/o M. Davison, 44 Court St., plans by M. N. Weinstein, 93 Court St., 6 story apartment, 56th St. and 14th Ave. $180,000.

**N. Y., Brooklyn**—Ridgelawn Homes, Inc., 640 86th St., plans by R. M. Bryson, 16 Court St., constructing group 2 story, brick dwellings, 90th St. near Battery Ave. $140,000.

**N. Y., Flushing**—Supro Homes, Inc., 120-08 97th Ave., Richmond Hill, plans by D. J. Levison, 161-02 84th Dr., constructing group 2 story, brick dwellings, 58th Ave. and Main St. $140,000.

**N. Y., Forest Hills**—Forest Hills Homes, National Title Bldg., Jamaica Ave., Jamaica, plans by J. E. Cahill, 89-64 163rd St., Jamaica, group 2 story, frame dwellings, Ingram St. near Herrick Ave. $140,000.

★ **N. Y., Greece**—Big Ridge Homes & Gardens, Greece, J. A. Williams, pres., plans constructing residences incl. roads, sewers, walks, mains, roads, etc., on 400 acre site on Irving Rouse Estate from Ridgeway to Lexington Ave. $500,000. Private plans.

**N. Y., New York**—Armstrong Buehnell Co., 300 Madison Ave., plans by A. L. Wilson, c/o owner, altering heating, plumbing in 5 story apartment, 67 West 106th St. $48,000.

**N. Y., New York**—Fort Tryon Park Properties, Inc., 505 5th Ave., S. Narkin, pres., plans by J. M. Felson, 250 West 57th St., 6 story, 89x105 ft. apartment, 491 Fort Washington Ave. $200,000.

**N. Y., New York**—Greenwich Savings Bank, 1356 Bway., plans by I. Silverstone, c/o owner, altering heating, plumbing in 5 story apartment, 153 East 48th St. $75,000.

**N. Y., New York**—Two Thousand Twenty-Eight Bway. Co., 152 West 42nd St., plans by Schwartz & Gross, 347 5th Ave., altering heating, plumbing in 12 story apartment, 2030 Bway. $65,000.

†*Federal Government*

**N. Y., New York**—Northwest Servicing Corp., 1601 University Ave., plans by J. M. Felson, 250 West 57th St., constructing 6 story apartment, Walton Ave., Grand Concourse and 174th St. $300,000.

★ **N. Y., New York**—Memorial Hospital, H. P. Robbins, pres., 2 West 106th St., plans by James Gamble Rogers, 154 East 46th St., 12 story, hospital for treatment of cancer and allied diseases, York and First Aves., 67th and 68th Sts. $3,000,000. Gift from General Education Bd. founded by J. D. Rockefeller Sr.

**N. Y., New York**—Fifth Avenue and Twelfth Street Corp., 55 5th Ave., plans by Minoque & Palmer, 17 East 49th St., altering heating and plumbing in 5 story apartment, 425 West 57th St. $10,000.

**N. Y., New York**—Olop Corp., c/o A. Giodano, 2488 Grand Concourse, plans by C. Kreymborg, 349 East 149th St., 6 story, brick apartment, 199th St. and Valentine Ave. $200,000.

**N. Y., New York**—Two Hundred Fifty Northern Avenue Corp., 250 Northern Ave., and 521 5th Ave., plans by Boak & Paris, 101 Park Ave., constructing 8 story apartment, 822 West 187th St. $250,000.

**N. Y., New York**—W. F. R. Ballard, 101 Park Ave., plans altering heating, plumbing in 5 story apartment, 38 East 75th St. $37,000 with fixtures. Private plans.

**N. Y., Patchogue**—Village Bd., Town Hall, called a public hearing May 6, to decide on acceptance of gift for constructing hospital from estate of Nettie Roe. C. N. Butler, mayor. Noted Apr. 1, C. D.—Apr. 4, E. N.-R.

## Bids Asked

**The McGraw-Hill *Construction Daily* reports more news of "Bids Asked" than the weekly service reports. The *Daily* allows more bidding time. $10 per month. Order through Business News Department, *Engineering News-Record*, 330 W. 42nd St., New York, N. Y.**

**N. Y., Rego Park**—Budget Homes, Inc., 62nd Ave. and 82nd Pl., plans by J. Unger, 39-01 Main St., Flushing, constructing 3rd unit group 40 dwellings, 62nd Ave. and 82nd Pl. $140,000.

**N. Y., St. Albans**—Bellwin Realty Corp., c/o D. Campbell, Natl. Title Bldg., Jamaica, plans by J. E. Cahill, 89-64 163rd St., Jamaica, plans group frame dwellings, 205th St. near 116th Ave. $140,000.

**N. Y., Schenectady** — Eastern New York Orthopedic Hospital School, Inc., 1090 Baker Ave., soon takes bids brick, steel hospital, plain found., Rosa Rd. J. M. Ryder, 122 Jay St., archt. Noted Mar. 27, C. D.—Apr. 2, E. N.-R.

**N. Y., Syracuse**—Office F. G. Smith, executive secy., Administration Bldg., soon lets contract constructing, heating, ventilating, refrigeration, plumbing, electrical work for Medical College, at Syracuse University. P.W.A. project. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

**N. Y., Tonawanda**—First Church of Christ, Broad and Seymour Sts., plans completed by Green & James, Buffalo, constructing church, Grove St. To exceed $105,000.

**N. Y., Utica**—Majestic Theatre Corp., Lafayette St., plans remodeling and renovating Majestic Theatre and Majestic Hotel. Private plans.

**O., Cleveland**—Firestone Tire & Rubber Co., Euclid Ave., East 18th St., Akron, A. F. Hoener, ch. engr., plans by H. H. Partridge, c/o owner, 1 story, timber, steel exhibition, along Lake Erie. $150,000.

**Pa., Erie**—St. Vincents Hospital, 2420 Sassafras St., making plans installing fire alarm system and emergency lighting system for 3 buildings. Meyers & Johnson, 821 Commerce Bldg., archts.

**Pa., Lancaster**—Franklin and Marshall College, Administration Bldg., College Campus, bids probably in May, library building addition and liberal arts building. W. H. Lee, Schaff Bldg., Phila., archt. Wolfe & Jones, Otis Bldg., Phila., structural engrs. Noted Feb. 5, C. D.—Feb. 13, E. N.-R.

**Wis., Watertown**—E. Brielmaier & Sons, archts., 735 North Water St., Milwaukee, soon lets contract 3 story, basement, 58x68 ft. and 41x65 ft., brick, steel, stone addition to St. Mary's Hospital, plain found. Noted Feb. 24, C. D.—Feb. 27, E. N.-R.

★ **Ont., Ottawa** — Central Bank of Canada, Victoria Bldg., Wellington St., plans by T. W. Fuller, Dpt. P. Wks., Ottawa, new bank, Wellington St. Est. about $600,000.

**Que., Ile Maligne**—Saguanay Power Ltd., M. Dubois, supt., Arvida, plans by L. E. Shlemm, 1178 Phillips Pl., Montreal, house building program. $200,000.

★ **Que., Quebec City** — St. Michel Archangel St. and Charest Blvd., plans 9 story office building. $500,000.

★ **Que., Quebec City**—St. Michel Archangel Hospital, Mastain St., plans by P. Levesque, 115 St. John St., two 44x222 ft. and 63x254 ft. additions to hospital, Mastain St. $500,000.

### BIDS ASKED

**Ind., Indianapolis**—See "Contracts Awarded."

**Mass., Cambridge**—May 6, by Cram & Ferguson, archts., 248 Boylston St., Boston, 2 story, basement, 70x95 ft., church and 3 story, basement, 45x135 ft., monastery, brick, stone, steel, granite, concrete founds., Memorial Dr., for Society of St. John the Evangelist, S. Barton, pastor, Memorial Dr. To exceed $140,000. Buerkel & Co., Inc., 24 Union Park St., Boston, engrs. Noted Feb. 28, C. D.—Mar. 5, E. N.-R.

**N. J., Glen Rock**—See "Contracts Awarded."

**N. J., Mountain View** — See "Contracts Awarded."

**N. Y., Bellerose**—See "Contracts Awarded."

**N. Y., Brooklyn**—See "Contracts Awarded."

**N. Y., Flushing**—See "Contracts Awarded."

**N. Y., Kew Gardens** — See "Contracts Awarded."

**N. Y., Middletown**—May 4 (extended date), by Orange Co. Telephone Co., constructing telephone building, John St. R. R. Grahams, Middletown, archt. E. E. Seelye & Co., 101 Park Ave., New York, engrs. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

**N. Y., New York**—See "Contracts Awarded."

**N. Y., White Plains** — See "Contracts Awarded."

**O., Cleveland**—May 1, by Ohio Bell Telephone Co., G. A. Kositsky, ch. engr., 750 Huron Rd., constructing 2 story, basement, 106x107 ft., brick, rein.-con. telephone exchange, Blossom Park. Est. $250,000. E. G. Conrad, Hanna Bldg., archt.

★ **Ont., Toronto**—H. O. Moore, archt., 1207 Bay St., taking bids 8 story, basement, 112 suites, rein.-con., brick apartment house, plain found., Huron and Lowther Sts., for T. Hancock, c/o architect. $750,000.

### CONTRACTS AWARDED

**Conn., Torrington**—F. Buzzi & Sons, general contractors, 586 South Main St., granite for 3 story, brick, steel, stone, city hall, to Torrington Monumental Art Wks., 634 South Main St., for City***plumbing, heating, ventilating, to T. A. Walker Co., Inc., Water St.***excavating to Oneglia & Gervasini, Inc., Gasson Ave. Noted Apr. 6, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

★ **D. C., Wash.**—Warner Bros. Pictures, Inc., 321 West 44th St., New York, general contract Uptown Theatre and 6 stores, 3420 Connecticut Ave., to Associated Construction, Inc., Market St. Natl. Bank Bldg., Phila., Pa. Est. $500,000. Kubitz & Koenig, Emerson Tower Bldg., Baltimore, Md., engrs. J. J. Zink, 2826 Overland Ave., Baltimore, Md., archt.

**Ind., Indianapolis**—E. G. Bauer & Son, Inc., 36 South Penn St., 6 story, basement, 53x151 ft., brick, rein.-con., steel apartment house, 3720 North Meridan St. Owner builds. $150,000. Applied to Zoning Comm. for permit and will reserve bids on materials and award sub-contracts. O. Williamson, Pennway Bldg., s.e.c. Penn and New York Sts., archt.

**Mass., Swampscott**—J. Nason, 52 Broadway, Lynnfield, residential development, incl. 75 residences, 6 room with garage, frame construction, concrete founds., Shaw Estate. Owner builds. Four to be started this week. To exceed $740,000. C. F. Springall, 50 Park St., Malden, archt.

**Mo., Clayton** (St. Louis P. O.)—Lichtenstein Estate, Inc., c/o P. F. Lichtenstein, 2944 Locust St., St. Louis, general contract two 3 story, basement, apartments, on 115x130 ft. sites, one at Byron Pl. near Westwood Dr. and other at Parkdale Ave. near Westwood Dr., to S. Brown, c/o B. Shapiro, archt., Wainwright Bldg., St. Louis. Est. $240,000.

★ **Mo., University City** (St. Louis P. O.)—Delmar Investment, Delmar Blvd. and Center Dr., general contract thirty-one 2 story, basement, duplex houses, Delmar Blvd., between Warder Ave. and Center Dr., to Oliver Kraehe & C. F. Vatterott, c/o owner. Est. $500,000. A. Winkler, c/o owner, archt.

**Neb., Omaha**—Union Outfitting Co., 16th and Jackson Sts., remodeling elevator shafts, glass doors installed, etc., in department store, 16th and Jackson Sts., to Ray Gould, 929 City Natl. Bank Bldg., Omaha, about $50,000.

**N. J., Glen Rock**—A. J. Roughgarden, Hawthorne, constructing brick, frame dwellings, South Highwood Ave., near Maple Ave., day labor and separate contracts. $140,000. Private plans. Noted Feb. 13, C. D.—Feb. 20, E. N.-R.

**N. J., Mountain View**—J. R. Francke, Inc., Packanack Lake, constructing (2nd) group frame dwellings, Packanack Lake, day labor and separate contracts. $140,000. A. A. McMurray, Packanack Lake, Mountain View, archt.

**N. Y., Bellerose**—Bellerose Housing Corp., 163-18 Jamaica Ave., Jamaica, constructing forty 2 story, frame dwellings, 251st St. and

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Commercial Buildings (Continued)

87th Dr., day labor and separate contracts. $140,000. Owner purchasing materials. F. J. Burmeister, 155-31 Jamaica Ave., Jamaica, archt. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**N. Y., Brooklyn**—Eden Homes, 449 Kings Highway, group brick dwellings, 1770 East 28th St., day labor and separate contracts. $140,000. I. Kallich, 375 Fulton St., archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**N. Y., Brooklyn**—Adrain Van Sinderen, 40 Remsen St., Brooklyn, and 40 Wall St., New York, altering heating, plumbing in two 6 story apartments, 419 Hicks St., separate contracts. $60,000. C. Clarke, c/o owner, archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**N. Y., Elmhurst** — Elbertson Realty Corp., 552 Beach 131st St., Belle Harbor, constructing 6 story apartment, Whitney Ave. and Elbertson St., separate contracts now being awarded. $140,000. Morris, Rothstein & Son, 2917 Fulton St., Brooklyn, archts. Noted Mar. 25, C. D. —Apr. 2, E. N.-R.

**N. Y., Flushing**—Friendship Homes, Inc., 150 West 55th St., New York, constructing group 1 story, 21x43 ft. dwellings, 166th St. and Franconia Ave., separate contracts. $140,000. E. Fels, c/o owner, archt. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**N. Y., Jamaica**—Gertz & Co., 162-10 Jamaica Ave., constructing department store annex, New York Ave., to Caye Constr. Co., 356 Fulton St., Brooklyn, $275,000. Noted Oct. 18, C. D. —Oct. 24, E. N.-R.

**N. Y., Kew Gardens**—Blumor Homes Corp., 106-11 150th St., Jamaica, constructing group 2 story, frame dwellings, Grand Central Parkway, day labor and separate contracts. $140,000. Owner will purchase materials. D. J. Levinson, 161-02 84th Dr., Jamaica, archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**N. Y., Martinsville**—W. B. Harder, general contractor, 27 Bissell Dr., Eggertsville, structural steel for St. Pauls Evangelical Lutheran Church, c/o F. A. Hinnars, 445 Falls St., North Tonawanda, to Buffalo Structural Steel Corp., 166 Dart St., Buffalo. Noted Nov. 1, C. D.— Nov. 7, E. N.-R.

**N. Y., New York**—A. C. L. Realty Corp., 49 Elizabeth St., altering heating, plumbing in two 5 story apartments, 312 East 116th St., separate contracts. $45,000. A. L. Wilson, c/o owner, archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**N. Y., New York**—American Bible Society, 4th Ave. and 8th St., altering heating and plumbing in 4 story apartment, 333 East 85th St., separate contracts. $40,000. J. Bleich, 565 East Tremont Ave., archt. Noted Mar. 25, C. D.—Apr. 2, E. N.-R.

★ **N. Y., New York**—One Thousand Four Hundred Forty-Eight Broadway Realty Corp., 1450 Bway., constructing restaurant and stores, 1450 Bway., separate contracts awarded. $500,000. Longchamps Restaurants, 1015 Madison Ave., lessee. L. A. Abramson, 25 West 45th St., archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

**N. Y., New York**—L. Foster, 35 West 177th St., constructing 6 story apartment, Nelson Ave, near 166th St., separate contracts. $140,000. E. Herzog, c/o owner, archt.

**N. Y., New York**—Two Thousand Two Hundred Sixty-Five University Avenue Realty Corp., 535 5th Ave., constructing 6 story apartment, University Ave, near 183rd St., separate contracts now being awarded. $175,000. J. M. Felson, 250 West 57th St., archt. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**N. Y., Syracuse**—Owner, c/o Eagan Real Estate, Inc., 212 Harrison St., general contract renovating and constructing 5 story addition to store and restaurant, 414 South Salina St., to W. J. Burns Co., 601 East Jefferson St. General contractor awarded contract for metal lathing and plastering, to F. J. Schneider, 362 Wadsworth St.***plumbing, to Burns Bros., Inc., 417 South Clinton St.***heating, to W. George & Co., 126 North Warren St.***electrical work, to L. W. Kiesewetter, 618 North Salina St. ***painting, to H. G. Masterson, 208 McAllister Ave., Childs Co., 200 5th Ave., lessee for 1st floor. P. Hueber, 112 Harrison St., archt.

★ **N. Y., White Plains**—Corporation, c/o J. P. Day, 67 Liberty St., New York, stores and apartments, Mamaroneck and Martine Aves., to C. T. Wills, 286 5th Ave., New York. Est. $1,000,000. Noted Mar. 25, C. D.—Mar. 26, E. N.-R.

## INDUSTRIAL BUILDINGS

### PROPOSED WORK

**Calif., Acampo**—WINERY—Cherokee Vineyard Assn., c/o P. Sala, archt., 2130 North Commerce St., Stockton, plans winery, Georgia Station. $75,000 or more.

**Calif., Monterey** — FACTORY — M. Spazier, Santa Monica, sketches by C. J. Rutland, Box 790, soap factory, Del Monte Ave. $50,000. Negotiations for site now under way.

★ **Calif., Oakland** — GLASS PLANT — P. J. Walker Co., Sharon Bldg., San Francisco, managers of construction, Owens-Illinois Pacific Co., 1855 Folsom St., San Francisco, will ask for bids on segregated units of glass plant, Fruitvale and Alameda Aves. $1,500,000. All work will be done by contract. Noted Mar. 6, C. D.—Apr. 2, E. N.-R.

**Calif., San Leandro**—FACTORY—Friden Calculating Machine Co., 1 Montgomery St., San Francisco, 1 story, 75x265 ft. factory, Washington Ave. $50,000. Architect not appointed.

**Colo., Canon City** — PLANT — Consolidated Feldspar Corp., 28 West State St., Trenton, N. J., plans feldspar crushing and treating plant, First and Water Sts. $100,000. (Correction—address of owner.) Noted Mar. 19, C. D.—Mar. 26, E. N.-R.

**Conn., Bristol**—MILL—Wallace Barnes Co., 30 Main St., making plans brick, steel addition to rolling mill. Est. $37,000 or more. Private plans.

**Conn., Stamford**—FACTORY—Pitney Bowes Postage Meter Co., 763 Pacific St., J. H. Williams, mgr., plans by H. Chapman, 95 Hope St., 2 story, brick, steel factory additions, Pacific St. To exceed $37,000.

**Ga., Columbus**—MILL—Swift Mfg. Co. soon takes bids constructing 4 story, basement mill addition. Roberts & Co., Bona Allen Bldg., Atlanta, engr.

**Ill., Chicago** — FREIGHT TERMINAL — Keeshin Transcontinental Freight Lines, North Canal and West Fulton Sts., plans constructing two 3 story freight terminal and motor freight handling facilities, South Clark and Roosevelt Aves.

★ **Ill., Streator** — PLANT — Owens Illinois Glass Co., Streator, plans rehabilitation of bottle manufacturing plant. $2,000,000 or more. Will finance from stock issue.

**Indiana**—DISTILLERY—G. H. Frederick Distillers, Inc., G. H. Frederick, pres., 4849 Glenway Ave., Cincinnati, O., plans distillery in Dearborn Co. across line from Harrison, O. $250,000.

**Ind., Fort Wayne**—MEAT CURING PLANT, etc.—Peter Eckrich & Sons, H. Echrich, mgr., soon takes bids constructing 1 story, 200x300 ft., brick, steel meat curing plant and office addition, Osage St. $125,000. Private plans.

**Ia., Des Moines**—PLANT—New Monarch Machine & Stamping Co., 406 Southwest 9th St., plans reconstructing Plant 2. $38,000 with equipment. **Maturity indefinite.** Architect not appointed.

**Ia., Des Moines**—FACTORY—Western Silo Co., 1003 Murphy St., plans constructing factory. $38,000 with equipment. Architect not appointed.

**Ia., Red Oak**—LIGHT and POWER PLANT—Nebraska Light & Power Co., Lincoln, Neb., bids in spring, constructing light and power plant. $250,000.

**Mass., Salem**—WAREHOUSE—Salem Fruit & Produce Co., 22 Front St., indefinitely postponed construction of 1 story, basement, 70x130 ft., brick, steel, concrete perishable fruits and vegetables warehouse. $37,000. W. H. Hunt & Son, 6 St. Peter St., archt. Noted Mar. 31, C. D.—Apr. 9, E. N.-R.

**Minn., Hopkins** — BOILER HOUSE, etc. — Minneapolis Moline Power Implement Co., W. C. Rich, secy., soon lets contract 1 story, basement, brick, steel boiler house. $125,000. Private plans.

**Mo., St. Louis**—GARAGE—St. Louis Public Serv. Co., H. W. Kiel, federal trustee, 3869 Park Ave., plans by V. A. Volkmann, c/o owner, and soon takes bids altering existing structure to convert from street car shed to motor bus garage and constructing 1 story, rein.-con., brick bus garage addition, Hodiamont and Maple Aves.

**N. Y., Bath**—FOUNDRY—Ward Foundry Co., Blossburg, Pa., plans industrial building at Wilson Ave. and plans altering and improving same for foundry use. To exceed $37,000. **Maturity indefinite.**

**N. Y., Long Island City**—PLANT—De Voe Iron Wks., 33-35 9th St., plans altering and repairing plant, 33-35 9th St. $37,000 with equipment.

**N. Y., New York** — COKE HANDLING PLANT, etc.—Consolidated Edison Co., 4 Irving Pl., plans improving coke handling plant, coke yards and pockets, etc., 427 East 110th St. $37,000 with equipment. Private plans.

**N. Y., New York**—STORAGE—Fidelio Brewery, Inc., 501 5th Ave., plans by J. D. Weiss, 119 West 57th St., altering 3 story storage, 337 East 29th St. $40,000 with equipment.

★ **N. Y., Olean** — OIL REFINERY — Socony Vacuum Oil Co., Olean, and Rockefeller Plaza, New York, plans modernization of oil refinery, incl. new electrical equipment, constructing brick, steel solvent extraction plant, plain found., for removing wax from oil to be used as lubricants, $1,500,000; will also spend $150,000 for new electrical equipment to furnish additional power for above plant. Private plans.

★ **N. Y., Rochester**—PLANT—Eastman Kodak Co., Kodak Park, Rochester, plans constructing 6 story, 61x142 ft. research laboratory addition, Lake Ave.; 5 story, 122x566 ft. paper department building known as Building 57; and 5 story, 42x162 ft. building for manufacturing lenses and special photographic apparatus, St. Paul St. Total $1,100,000. Private plans.

**N. Y., Rochester** — SUPER-SERVICE STATIONS—Goodyear-Wende Oil Corp., A. J. Hocking, mgr., Union Trust Bldg., plans constructing and operating several super-service stations, underground steel tanks, electric pumps, compressors, etc. To exceed $37,000.

**N. Y., Solvay**—PLANT—Semet Solvay Co. (subsidiary of Allied Chemical & Dye Co.), B. Torrey, in charge), Solvay, plans coking plant, Milton Ave. To exceed $2 [illegible]. Private plans.

★ **O., Toledo**—PLANT—Libbey Glass Mfg. Co., Ash & Wheeling & Lake Erie R'R tracks, plans improvements to glass tableware mfg. plant. $1,000,000. Owner will finance by stock issue.

**Okla., Enid**—ELEVATOR, STORAGE, etc.—Geis Mills plans constructing elevator, storage and mill. Est. about $37,000 with equipment. **Maturity indefinite.** Architect not appointed.

**Pennsylvania** — POWER PLANT, etc. — See "Contracts Awarded."

**Pa., Fawn Grove**—PLANT—Fawn Grove Mfg. Co., c/o A. H. Morris, Fawn Grove, plans equipment plant. $40,000. **Maturity indefinite.** Architect not appointed.

**Pa., Lewistown**—GAS DISTRIBUTION PLANT —See "Contracts Awarded."

**Pa., Wilkes-Barre**—PLANT—J. B. Carr Biscuit Co., J. B. Carr, pres., 169 North Pennsylvania Ave., bids about May 1, constructing 4 story, 30x100 ft., brick, steel addition to food products plant, also 2 story, 15x32 ft., boiler steel office building, Pennsylvania Ave. To exceed $37,000. R. K. Wolborn, Wilkes-Barre, archt.

**N. B., Dalhousie**—POWER PLANT—Gatineau Power Co. Ltd., Wellington St., Ottawa, Ont., soon takes bids constructing 10,000 hp. turbine-generator steam unit to supplement the Grand Falls supply of electrical energy to plant. $300,000. R. W. Howard, Ottawa, Ont., engr.

**Ont., Hamilton**—PLANT—Gerald T. Shipping & Co. Ltd., 29 Dundas St., London, plans by A. M. Piper, 1 Moore Bldg., London, two 1 story, 45x150 ft. and 85x150 ft., brick, steel buildings for wholesale paper plant, plus foundes., Canell St. near Bay St. $100,000. Noted Mar. 31, C. D.—Apr. 9, E. N.-R.

**Ont., North Cobalt** — MILL — H. F. Fahey, engr., North Cobalt, soon lets contract constructing new mill for Cobnor Silver Mines Ltd., Toronto. $40,000.

**Ont., Timmins**—PLANT—L'Imprimerie Populaire du Nord Ltee., U. Lacasse, mgr., plans constructing and equipment of general printing, engraving, publishing and newspaper plant.

**Ont., Windsor**—FACTORY—Duplate Windsor Ltd., A. LaPierre Smoke, pres., Toronto, plans factory for manufacture of all kinds of glass, $50,000.

**Ont., Tillsonburg**—PLANT—Walter H. Gilson and Caloff, prepares plans shoe manufacturing plant and will install all new equipment.

**Que., Hull**—FACTORY—Federal Match Ltd., J. W. Charette, pres., plans new match factory, $100,000.

**Que., Montreal**—FACTORY—Dauray Freres & Cie, Inc., 432 Fourth Ave., New York, reconditioning factory and installing equipment for manufacturing yarns and knitted goods, separate contracts. Est. $37,000 with equipment.

**Que., Noranda** — PLANT — Noranda Mines Ltd., Noranda and Montreal, plans have been deposited with Dpt. Lands & Forests, Quebec, and soon takes bids new power generating plant and dams on Rapid No. 7, Upper Ottawa River, where it passes the Townships of Jourdan, Magerol, Loudanet and Chapot. Timiskaming Co.

### BIDS ASKED

**Calif., San Leandro** — FACTORY — F. H. Riemers, archt., 233 Post St., San Francisco, taking bids 1 story, 72x262 ft., rein.-con. factory, for Friden Calculating Machine Co., 1 Montgomery St., San Francisco. $50,000. Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

**Calif., Richmond**—PLANT—See "Contracts Awarded."

**Mont., Helena** — SHOP — See "Contracts Awarded."

**Mont., Livingston**—RAILROAD SHOPS—See "Contracts Awarded."

**N. Y., Dunkirk** — PLANT — See "Contracts Awarded."

**N. Y., New York**—STORAGE and SHOWROOM—See "Contracts Awarded."

**N. Y., Palmyra**—FACTORY—See "Contracts Awarded."

**N. Y., Richmond Hill**—GARAGE, STORAGE, etc.—See "Contracts Awarded."

**N. Y., Seneca Falls** — WAREHOUSE — See "Contracts Awarded."

**Pa., Munhall**—METALLURGICAL LABORATORY—See "Contracts Awarded."

**Tenn., Morristown** — MILL — Aronson & Hirschfield Silk Mills, bids about May 1, 52x100 ft. mill addition. $38,000 or more with equipment. R. E. Smith, Morristown, archt.

**Tex., Brownsville** — COTTON COMPRESS — See "Contracts Awarded."

**Que., Montreal**—FACTORY—See "Contracts Awarded."

### CONTRACTS AWARDED

**Calif., Newark**—FACTORY—Austin Co. of California, general contractors, 516 18th St., Oakland, structural steel and steel sash for two 1 story, wood frame and galvanized fac-

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†*Federal Government*

Industrial Buildings (Continued)

tories, to Bethlehem Steel Co., 20th and Illinois Sts., San Francisco, for Jas. Graham Mfg. Co., Newark, reinforcing steel, to Truscon Steel Co., 604 Mission St., San Francisco, brick work, to Remillard Dandini Co., 569 3rd St., Oakland, concrete materials, to P. C. Hansen Lumber Co., Newark. Noted Apr. 10, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

**Calif., Richmond**—PLANT—California Spray & Chemical Co., constructing chemical spray plant, to Stone & Webster Eng. Co., engrs., 90 Broad St., New York, by day labor and separate contracts. Est. $100,000.

**Conn., Bridgeport**—Mott Constr. Co., general contractors, 440 Elm St., New Haven, fans for boiler plant and steel point power station, to Stuyvesant Co., West Farms Rd. and 176th St., New York, for United Illuminating Co., 84 Temple St., New Haven, coal gates, to Gifford Wood Co., 420 Lexington Ave., New York, coal conveyors, to Robins Conveying Belt Co., 15 Park Row, New York. Noted Apr. 13, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

**Conn., Bristol**—FACTORY—Torrington Building Co., general contractors, 182 Church St., Torrington, excavating for 3 story, 40x80 ft. and 40x160 ft. factory addition, North Main St., for E. Ingraham Co., 302 North Main St., to E. L. Dunn, 481 North Main St. Noted Feb. 24, C. D.—Feb. 27, E. N.-R., under "Contracts Awarded."

**Conn., East Hartford**—PLANT—National Oil Corp., C. H. Fuller, pres., 1265 Main St., Hartford, pipe lines for oil terminal plant, to R. Bens, Rockland, Mass.; tanks to Chicago Bridge & Iron Wks., 250 Stuart St., Boston, Mass. Noted Mar. 6, C. D.—Mar. 12, E. N.-R.

**Conn., New Haven**—WAREHOUSE—Turner Constr. Co., general contractors, 420 Lexington Ave., New York, foundations for 1 story, 62x151 ft., brick, steel, concrete beer distributing plant, Dixwell Ave., to F. P. Sullivan, 127 Prospect St., East Haven, for P. Ballantine & Co., Inc., 57 Freeman St., Newark, N. J.; excavating, to Clarke-Barone Co., 585 Legion Ave. Noted Apr. 10, C. D.—Apr. 16, E. N.-R., under "Contracts Awarded."

**Conn., New Haven** — WAREHOUSE — Turner Constr. Co., general contractors, 420 Lexington Ave., New York, reinforcing steel for 1 story, 62x151 ft., brick, tile beer distributing warehouse, to Jones & Laughlin, Inc., 30 Review Ave., Long Island City, N. Y., for P. Ballantine & Co., Inc., 57 Freeman St., Newark, N. J., electrical work, to S. J. Nielson, Electric Co., Inc., 226 Center St., heating and plumbing, to Foskett & Bishop Co., Blatchley Ave. Noted Apr. 24, C. D.—Apr. 30, E. N.-R.

**Conn., Waterbury**—FACTORY—American Brass Co., West Main St., 1 story, 70x240 ft., steel, concrete factory addition, incl. platform, freight and loading facilities, West Main St. Owner builds. Est. $37,000. Private plans.

**Ga., Athens** — HOSIERY MILL — Athens Hosiery Co., constructing hosiery mill, to Daniel Constr. Co., Anderson, S. C. Est. exceeds $40,000. Lockwood Greene, 30 Rockefeller Plaza, New York, engr.

**Ga., Atlanta** — FREIGHT DEPOT — Massell Realty Co., 119 Luckee St. N.W., constructing 1 story, basement, 60x90 ft. freight depot, 47 Trinity Ave. Owner builds. E. C. Seiz, Atlanta, archt. Awarded Apr. 15.

**Ga., Gainesville**—MILL—Pacolet Mfg. Co., Greenville, repairing large manufacturing company damaged by tornado, to Fiske-Carter Constr. Co., Greenville, S. C. J. E. Sirrine & Co., Greenville, S. C., engrs.

**Ga., Gainesville** — MILL — Owens-Osborne Hosiery Mills, Inc., constructing 2 story, basement, brick hosiery mills, to A. K. Adams & Co., Atlanta. J. E. Sirrine & Co., Greenville, S. C., engrs.

**Mass., Boston**—GARAGE—Railway Express Co., R. W. Thompson, supt. Buildings, 219 East St., New York, converting present 4 story, basement, 125x200 ft., concrete, steel building into garage, Congress St., to Hegeman Harris Co., 185 Devonshire St., Boston, and 360 Madison Ave., New York. Est. $250,000. Contractor now taking bids at Boston office, for subcontracts. Bids Mar. 9. Noted Mar. 5, C. D.—Mar. 12, E. N.-R.

**Mass., Salem**—FACTORY—Leslie R. Porter Co., general contractors, 156 Stuart St., Boston, plumbing for 1 story factory, to John F. Cabeen Co., 81 North St., for Hygrade-Sylvania Corp., 60 Boston St. Noted Apr. 7, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

**Mo., St. Louis**—FACTORY—Sanotuf Mattress Co., Inc., 1010 North 10th St., general contract 2 story, 15x127 ft. mattress factory, 1010 North 10th St., to P. Grossman, 2513 North Spring Ave.

**Mo., St. Louis**—TIN SHOP—Southern Equipment Co., 5017 South 38th St., general contract 1 story, 40x155 ft. brick tin shop addition, concrete found., 5017 South 38th St., to Webb-Boone Co., 5103 Fyler Ave.

**Mont., Helena**—SHOP—Northern Pacific R.R. Co., B. Blum, ch. engr., St. Paul, Minn., shop improvements, separate contracts and day labor. To exceed $38,000.

**Mont., Livingston** — RAILROAD SHOPS — Northern Pacific R.R. Co., B. Blume, ch. engr., St. Paul, Minn., improvements at shops, here, separate contracts and day labor. $37,000 with equipment.

**N. H., Hinsdale** — PAPER MILL — Hinsdale Paper Mfg. Co., L. D. Stearns, treas. and genl. mgr., Main St., rebuilding 3 story, basement, 74x180 ft., brick, steel, concrete paper mill, Main St., destroyed by fire, to J. W. Bishop Co., 109 Foster St., Worcester, Mass., probably exceed $100,000. Bids Apr. 3, awarded about Apr. 8. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

**N. Y., Brooklyn**—STORAGE, SHOP, etc.—Borough Hall Chevrolet Co., 7724 Colonial Rd., altering 2 story, concrete storage, shop and showroom, 33 Debevoise Pl., to W. Kennedy Constr. Co., 215 Montague St. Est. $37,000. Noted Mar. 27, C. D.—Apr. 2, E. N.-R.

**N. Y., Buffalo**—MALTING PLANT—Monarch Eng. Co., general contractors, Chamber of Commerce Bldg., structural steel for malting plant, for Francis Perots Sons Malting Co., 100 Childs St., to McMannus Steel Constr. Co., 2154 East Ferry St., Buffalo, caissons, to D. E. Horton Constr. Co., Prudential Bldg., brick masonry, to Crooker, Carpenter & Skaer, 120 Hardwood Pl. Est. $200,000.

**N. Y., Buffalo**—MALTING PLANT—Francis Perots Sons' Malting Co., 100 Childs St., general contract malting plant, to Monarch Eng. Co., Chamber of Commerce Bldg. Est. $200,000. General contractor awarded contract for reinforcing steel, to Recon, Inc., 154 West Huron St. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

**N. Y., Corning**—PACKING and ASSEMBLY PLANT—Corning Glass Wks., Walnut St., general contract 3 story, basement, 60x165x400 ft. packing and assembly plant, Walnut St., to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. $350,000. Private plans. Contractor will sublet heating, plumbing, electrical contracts. Noted Mar. 30, C.D.—Mar. 19, E. N.-R.

**N. Y., Dunkirk**—PLANT—Dunkirk Radiator Co., Middle Rd., constructing 200 ft., brick, steel plant addition, Middle Rd., day labor and separate contracts. To exceed $40,000. Private plans.

**N. Y., Fonda**—WAREHOUSE—Fonda Glove Lining Co., constructing warehouse, Caydulta St., to Morrell Vrooman, Inc., 21 North Main St., Gloversville. General contractor awarded contract for roofing, to Kaiser-Boswell Co., Inc., 5 Bridge St., Amsterdam; cement, brick, reinforcing steel and structural steel, incl. sash, to Pioneer Builders Supply Co., 21 North Main St., Gloversville. Noted Apr. 8, C. D.—Apr. 16, E. N.-R.

**N. Y., Geneva**—BOTTLING PLANT—Geneva Coca-Cola Bottling Corp., 543 Exchange St., Geneva, general contract bottling plant, North St., to W. Frantz, 20 Evans St., Geneva, plumbing and heating, to Riggs & Jensen, 475 Exchange St., Geneva, electrical work, to W. Maher, 9 Twombley St., Geneva, elevator, to Warsaw Elevator Co., Warsaw. Noted Mar. 31, C. D.—Apr. 9, E. N.-R.

**N. Y., New York**—STORAGE and SHOWROOM—A. H. Cardarelli, 101 Park Ave., general contract 4 story furniture storage and showroom, 195 West Houston St., to McArthur Constr. Co., 101 Park Ave. Est. $40,000. B. E. Stern, 11 East 44th St., and M. H. Belkin, c/o owner, archts. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

**N. Y., Palmyra**—FACTORY—Garlock Packing Co., A. Hubbard, in charge, Palmyra, constructing factory addition, own forces. Private plans. Owner will purchase masonry materials, heating unit, sprinkler system, roofing, structural steel. Noted Apr. 17, C. D.—Apr. 23, E. N.-R.

**N. Y., Richmond Hill**—GARAGE, STORAGE, etc.—A. L. Reed, c/o W. E. Hadler, archt., 107-10 103rd St., Ozone Park, constructing garage, storage and auto salesroom, Jamaica Ave. near 121st St., day labor and separate contracts. $37,000 or more. Noted Mar. 23, C. D.—Mar. 26, E. N.-R.

★ **N. Y., Rochester**—PLANT—Eastman Kodak Co., Kodak Park, general contract lens manufacturing plant, and constructing paper manufacturing building, to Ridge Constr. Co., Kodak Park, about $115,000 and $762,000 respectively. Noted Apr. 22, C. D.

**N. Y., Schenectady**—PLANT—J. E. Lowe & Sons, general contractors, 243 State St., 200 tons structural steel for printing plant, for Maqua Co., subsidiary General Electric Co., Schenectady, to American Bridge Co., Frick Bldg., Pittsburgh, Pa. Noted Feb. 14, C. D.—Feb. 20, E. N.-R.

**N. Y., Seneca Falls**—WAREHOUSE—Seneca Knitting Mills, Water St., Geneva, electrical work for 100x150 ft. warehouse, to Electric Shop, 82 Fall St., Seneca; roofing, to Carey Co., 103 Oak St., Geneva. Noted Apr. 23, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

**Pennsylvania**—POWER PLANT, etc.—Penn Central Light & Power Co., B. F. Cleaves, vice-pres., in charge, 11th Ave. and 12th St., Altoona, repairing power plant in Williamsburg, and electrical substation in Bedford, incl. reconditioning transformers, generators, switchboards and instruments, cables, breakers, lightning arresters after flood, day labor.

**Pa., Erie**—POWER PLANT—Stone & Webster, general contractors, 49 Federal St., Boston, Mass., superstructure and foundation for building to house power plant, East Lake Rd., to H. Platt Co., 922 Raspberry St., for Hammermill Paper Co., East Lake Rd., E. R. Mehrend, pres. and H. G. Chaitain, in charge of Construction Department. Noted Feb. 6, C. D.—Feb. 13, E. N.-R., under "Contracts Awarded."

**Pa., Lewistown**—GAS DISTRIBUTION PLANT—Atlantic Gas Co., H. B. Coyle, mgr., South Dorcas St., buildings in South Dorcas St., for use as headquarters and distribution center for individual gas service business, incl. installation two 18,000 gal. steel tanks, service station and other equipment, day labor and separate contracts awarded. To exceed $37,000.

**Pa., Meadville**—PLANT—Wark & Co., general contractors, Sun Bldg., Phila., furnishing 3,570 tons structural steel for new factory, to Bethlehem Steel Co., 8th and Lehigh Sts., Bethlehem, for Viscose Corp., Marcus Hook, R. H. Crewdson, engr. in charge; 600 tons reinforcing steel for same, to Concrete Steel Co., 2 Park Ave., New York. Noted Mar. 6, C. D.—Mar. 12, E. N.-R., under "Contracts Awarded."

**Pa., Munhall**—METALLURGICAL LABORATORY—Carnegie Illinois Steel Co., J. E. Lose, vice pres. in charge of operations, Carnegie Bldg., Pittsburgh, 2 story, 32x110 ft., brick, steel metallurgical laboratory, plant site, own forces, and purchases materials. Est. $77,000. Private plans.

**Pa., Oakmont**—PLANT—Walters Mfg. Co., S. W. Weinthal, pres., 138 Pennsylvania Ave., 2 story, 80x100 ft., brick, steel manufacturing plant addition, incl. welding machinery, press equipment and new ovens, 138 Pennsylvania Ave., day labor. Foundations and brick masonry work, to Larnold, 456 North Ave., Oakmont, structural steel, to Levison Steel Co., 33 Pride St., Pittsburgh, steel windows, to Independent Erection Co., Century Bldg., Pittsburgh, machinery and equipment, to Reliance Mchry. Sales Co., 1407 Brighton Rd., N.S., Pittsburgh. Owner will build composition built-up roofing, by day labor, material purchased. Private plans.

**Pa., Schenley**—SERVICE—Jos. S. Finch & Co., 20 West 40th St., New York, general contract, 2 story, basement, 40x60 ft., brick, reinf.-con. service building, to Rust Constr. Co., Clark Bldg., Pittsburgh. C. J. Kiefer, 607 Schmidt Bldg., Cincinnati, O., engrs.

**Pa., York** — PLANT — Peoples Service Co., Frederick, Md., T. Files, treas., 1 story, 78x82 ft. ice manufacturing plant, North Beaver St., general contract, to Roy Buckingham, 405 North Newberry St., York, materials, to York Building Block Co., York, electrical work, to P. L. Crum, York. Est. $40,000 with equipment. Equipment includes Diesel engine, 2 large tanks, condensors, etc.

**Tex., Brownsville** — COTTON COMPRESS — Aransas Compress Co., Corpus Christi, J. K. Cain, pres., constructing cotton compress, shed capacity 30,000 bales of cotton or 70,000 bales of compressed. Preliminary work started under supervision of M. Loving, Harlingen, representative of owners. Most of construction will be by day labor. $200,000-$250,000. Private plans. Noted Apr. 12, C. D.—Apr. 16, E. N.-R. under "Contracts Awarded."

**Tex., Houston**—PLANT—Oil County Supply Co., Coffeyville, Kan., c/o D. I. Brown Mfg. Co., 1 story, 65x100 ft. assembly plant between Goose Creek Electric R.R. and Mo. Pacific R.R., 1 mi. northeast of here, to S. Cook, 5011 Center St. Est. about $50,000.

**Wis., Milwaukee** — GRAIN ELEVATORS — Froedert Grain & Malt Co., South 38th St. and West Grant St., constructing grain elevators, South 38th St., to Burrell Eng. & Constr. Co., 400 West Madison Ave., Chicago, Ill. Est. $350,000. Noted Mar. 11, C. D.—Mar. 19, E. N.-R.

**Ont., Toronto** — FACTORY — Jackson Lewis Co. Ltd., general contractors, 320 Bay St., painting 1 story, brick, steel factory, plain found., Dundas St., for National Cash Register Co. of Canada Ltd., 1131 Bloor St. W., to J. O. Doucall Ltd., 527 Bloor St. W. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

★ **Que., Comeau Bay** — PAPER MILL — Ontario Paper Co. Ltd., Thorold, Ont., general contract constructing paper development and paper mill, to Foundation Co. of Canada Ltd., 1538 Sherbrooke St. W., Montreal. Est. $8,000,000. Noted Apr. 8, C. D.—Apr. 16, E. N.-R.

**Que., Three Rivers**—GRAIN ELEVATOR—Carter-Halls-Aldinger Co., general contractors, 51 Cherry St., Toronto, Ont., structural steel for grain elevator, for Three Rivers Grain & Elevator Co. Ltd., c/o Toronto Elevators Ltd., Queens Quay, Toronto, Ont., to Canadian Vickers Ltd., Maisouneuve, reinforcing steel, to Dominion Steel & Coal Corp. Ltd., Canada Cement Bldg., Montreal, steel doors, buckets, etc., to Eastern Steel Products Ltd., 1335 Delorimear Ave., Montreal, motors, to Bepco Canada Ltd., 1050 Mountain St., Montreal, beltings, to Goodyear Tire & Rubber Co. of Canada, 679 St. James St. W., Montreal, Gutta Percha & Rubber Ltd., 685 St. James St. W., Montreal, and Dunlop Tire & Rubber Goods Co. Ltd., 607 Craig St. W., Montreal, scales, to Canadian Fairbanks-Morse Co. Ltd., 980 St. Antoine St., Montreal, conveying machinery, to Canada Iron Foundries, 227 St. Maurice St., electrical work, to LaCie Electrigue Goulet, Quebec, elevators, to Roelofson Elevator Co. Ltd., 289 Sumach St., Toronto, Ont. Noted Feb. 26, C. D.—Mar. 5, E. N.-R.

†*Federal Government*

# WHY THIS STEADY PREFERENCE FOR CONCRETE ?

Why does concrete continue, year after year, to be the preferred highway pavement? The answer is as simple as A-B-C:

## A

Concrete is satisfying. Motorists appreciate the smooth, restful ride it affords; the absence of ruts, jolts and wheel-strain with consequent freedom from tension and fatigue.

## B

Concrete is safe. Its surface is smooth but non-skid, wet or dry; it reduces the frequency of accidents; and its light grey color with sharply defined edges gives maximum visibility at night.

## C

Concrete is economical. It actually costs less to build than any other pavement of equal load-bearing capacity; it lasts longer; its maintenance cost is far less and it saves money for motorists by reducing gas, tire and car repair expense.

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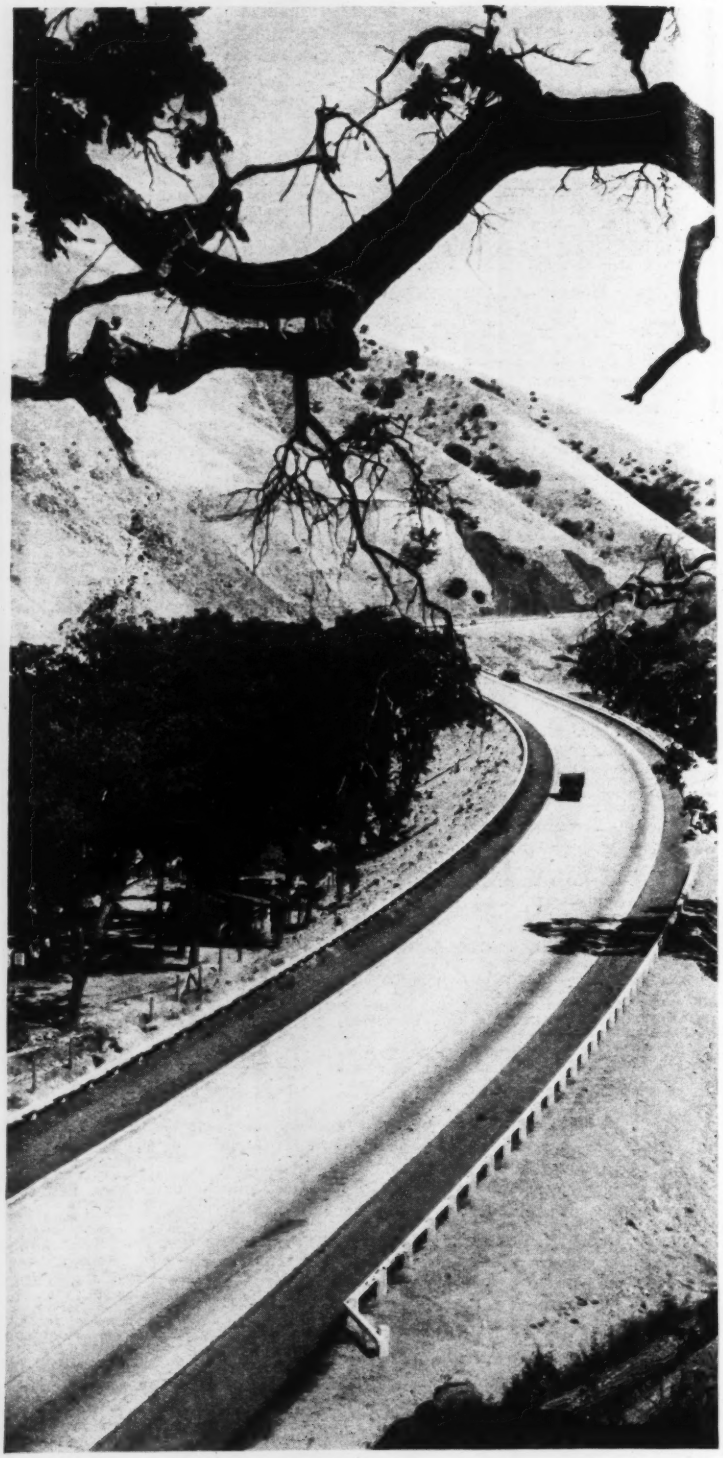
Dept. A-4e-17, 33 West Grand Avenue, Chicago, Ill.



*New Ridge Route section State Highway No. 4 in Grapevine Canyon, California*